PB89-206254

Superfund Record of Decision (EPA Region 2)
Reich Farm Dover Township, Ocean County, New Jersey
(First Remedial Action) September 1988

(U.S.) Environmental Protection Agency, Washington, DC

30 Sep 88

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-88/070
September 1988

PB89-206254

EPA

Superfund Record of Decision:

Reich Farms, NJ

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

REPORT DOCUMENTATION PAGE

1. REPORT NO. EPA/ROD/R02-88/070

2.

3. Recipient's Accession No. PB89 206254/AS

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Reich Farm, NJ
First Remedial Action - Final

5. Report Date 09/30/88

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered 800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Reich Farm site is located in Dover Township, Ocean County, New Jersey. The three-acre site is bounded by commercial establishments to the west and wooded areas in all other directions. The site is approximately one mile northeast of the Toms River, but no floodplains or wetlands are affected by the site. The site is currently owned by Mr. and Mrs. Samuel Reich. In August 1971, they rented a portion of their land to Mr. Nicholas Fernicola for temporary storage of used 55-gallon drums. That December, the Reichs discovered approximately 4,500 drums containing wastes and 450 empty drums on that portion of their property. Most of the drums had Union Carbide Corporation (UCC) markings on them, with labels reading "tar pitch," "lab waste solvent," "blend of resin and oil," and "solvent wash of process stream" among others. The site first came to the attention of the New Jersey Superior Court when the Reichs filed suit against Mr. Fernicola and UCC. UCC undertook drum removal and completed the work in March 1972. In June 1974, another 51 drums and approximately 1,100 yd^3 of contaminated soil and trenched wastes were removed from the site, but residents near the site had already complained about unusual taste and odor in their well water. Based on results of an extensive sampling program, the Dover Township Board of Health ordered 148 private wells closed and established a zoning ordinance restricting ground water use in the area of
(See Attached Sheet)

Con't on pg i-a

17. Document Analysis a. Descriptors
Record of Decision
Reich Farms, NJ
First Remedial Action - Final
Contaminated Media: gw, soil
Key Contaminants: VOCs (PCE, TCA, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 110

22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

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16. ABSTRACT (continued) con't from pg 1

Reich Farm. The volume of contaminated soil remaining at the site is estimated to be 2,010 yd^3. The primary contaminants of concern affecting the ground water and soils are VOCs including 1,1,1-trichloroethane (TCA), TCE, PCE, and semi-volatile organics compounds (SVOCs).

The selected remedial action for this site are includes: additional ground water sampling to further delineate the leading edge of the contaminant plume and additional soil sampling to support existing data on contaminants of concern at the site; ground water pump and treatment using air stripping and carbon adsorption with reinjection of the treated water back into the aquifer; excavation and storage of surface soils onsite which do not require remediation; excavation of subsurface soils and onsite treatment by enhanced volatilization and onsite disposal, or shipment of subsurface soils which cannot be treated onsite to an offsite RCRA-permitted facility for incineration and disposal, followed by backfilling excavated areas with clean surface soils. The estimated present worth cost for this remedial action is $5,832,000, which includes annual O&M costs of $419,550.

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DECLARATION STATEMENT

RECORD OF DECISION

Reich Farm

SITE NAME AND LOCATION

Reich Farm, Dover Township, Ocean County, New Jersey

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the Reich Farm site, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent applicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300.

STATEMENT OF BASIS

I am basing my decision primarily on the following documents, which are contained in the administrative record, and which characterize the nature and extent of contamination and evaluate long-term remedial alternatives for the Reich Farm site:

- Final Draft Supplemental Remedial Investigation Report, Reich Farm, prepared by Ebasco Services, August 1988;
- Final Draft Feasibility Study Report, Reich Farm, prepared by Ebasco Services, August 1988;
- Proposed Remedial Action Plan, Reich Farm, August 1988;
- The attached Decision Summary for the Reich Farm site;
- The attached Responsiveness Summary for the site, which incorporates public comments received; and
- Staff summaries and recommendations.

DESCRIPTION OF SELECTED REMEDY

The remedial alternative presented in this document represents a final remedial solution for the Reich Farm site. It addresses subsurface soil contamination at the site and ground water contamination in the underlying aquifer. The Feasibility Study Report refers to the selected soil and ground water remedy as Alternatives S-5 and GW-2, respectively. A surface cleanup involving the removal of drums and other containers as well as contaminated soil has already been completed.

The specific components of the remedial action are as follows:

- Additional ground water sampling to further delineate the leading edge of the contaminant plume and additional soil sampling to support existing data on the contaminants of concern at the site;

- Extraction of contaminated ground water through pumping followed by on-site treatment and reinjection of the treated effluent into the ground. This process will continue until federal and state cleanup standards are attained to the maximum extent practicable; and

- Excavation and treatment of contaminated soil to meet New Jersey Soil Action Levels. A portion of the soil, contaminated with volatile organic compounds, will be treated by enhanced volatilization. Any soil which cannot be effectively treated by this technology to meet the cleanup levels will be taken off-site for incineration and disposal.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, I have determined that the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. Furthermore, this remedy satisfies the preference for treatment that reduces the toxicity, mobility or volume as a principle element and utilizes permanent solutions and alternate treatment technologies to the maximum extent practicable.

Because this remedy will not result in hazardous substances remaining on-site above health protective levels, the five-year review requirement will not apply to this action.

Sept. 30, 1988
Date

William J. Muszynski, P.E.
Acting Regional Administrator

DECISION SUMMARY

Reich Farm Site

Dover Township, New Jersey

SITE DESCRIPTION

The Reich Farm site is an open, relatively flat sandy area covering approximately three acres in the Pleasant Plains section of Dover Township, Ocean County, New Jersey (Figure 1). The site is surrounded by commercial establishments to the west and wooded areas in all other directions. Two buildings, located adjacent to the west side of the site, are occupied by several small businesses. The illegal drum dumping activities, which resulted in contamination of the site by hazardous substances, occurred on the portion of the site that is shown in Figure 2.

Within a half mile to the east and south of the site, land use is approximately sixty percent wooded and forty percent commercial. To the north, west and southwest, residential development covers half of the area; wooded areas and commercial operations comprise the remaining land use. The site is located approximately one mile northeast of the Toms River.

The Kirkwood-Cohansey aquifer system underlies the Reich Farm site. The upper portion of the system is generally referred to as the Cohansey aquifer and the lower portion as the Kirkwood aquifer. The average depth to ground water beneath the site is approximately thirty feet. The direction of ground water flow in this aquifer system is generally to the south-southwest.

The principle source of water for Dover Township is the Cohansey aquifer. As a result of a 1974 Dover Township Health Department zoning ordinance, there are no private wells within approximately 4500 feet of the Reich Farm site which tap into this aquifer. The area encompassed by this ordinance is represented as Zones I and II in Figure 3. The Toms River Water Company's (TRWC) Parkway Wellfield is located approximately one mile downgradient of the site. TRWC is a municipal water supplier in Dover Township. In June 1988, the wellfield pumped an average of 3.5 million gallons of ground water per day. Figure 4 shows the location of the Parkway Wellfield in relation to the site. Also shown in Figure 4 is TRWC's pumping well number 20, which is located over a mile southwest of the site.

SITE HISTORY

Origin of Problem

The Reich Farm site is currently owned by Mr. and Mrs. Samuel Reich. The legal description of the property is Block 410, Lot 22, on the Dover Township tax map. According to the Reichs, in August of 1971, they rented a portion of their land to

Mr. Nicholas Fernicola for temporary storage of used 55-gallon drums. That December, the Reichs discovered approximately 4,500 drums containing wastes and 450 empty drums on the portion of their land that was rented to Mr. Fernicola. The labels on the drums included "tar pitch", "lab waste solvent", "blend of resin and oil", and "solvent wash of process stream". Most of the drums had Union Carbide Corporation (UCC) markings on them. Trenches into which wastes may have been dumped were also found. These disposal activities resulted in contamination of the soils on-site and ultimately of the ground water.

Initial Enforcement Actions and Subsequent Remedial Measures

Mr. and Mrs. Reich, as well as the Township of Dover, filed complaints in New Jersey Superior Court against Mr. Fernicola and the Union Carbide Corporation which resulted in the Court ordering dumping to cease and the removal of all waste and drums. According to a TRW report entitled "Analysis of a Land Disposal Damage Incident Involving Hazardous Waste Materials Dover Township, New Jersey", and dated May 1976, drum removal was undertaken by Union Carbide and completed in March 1972. In June 1974, another 51 drums and approximately 1100 cubic yards of contaminated soil and trenched wastes were removed from the site. The soil was excavated on the basis of visual inspection and odor.

Early in 1974, some residents near the site observed an unusual taste and odor in their well water. Analyses performed on this water showed the presence of petrochemical contaminants, including phenol and toluene. A more extensive sampling program was then undertaken. Based on the results of this sampling, the Dover Township Board of Health (DTBH) ordered 148 private wells closed by the end of August 1974, and established a zoning ordinance restricting ground water use in the area of Reich Farm.

The New Jersey Department of Environmental Protection (NJDEP) filed suit against UCC charging the company with polluting the public water supply in the Pleasant Plains section of Dover Township by improperly disposing of liquid chemical wastes. The suit also named Nicholas Fernicola as a defendant. On April 21, 1977, UCC signed a Consent Order with NJDEP for the State to perform additional investigations at the site. In June 1977, NJDEP dropped charges against Nicholas Fernicola in return for Mr. Fernicola's agreement to cease hauling and disposing of chemical wastes.

Reich Farm was one of 418 sites placed on the EPA Proposed National Priorities List (NPL) published in December 1982. The final approval for inclusion on the NPL was given in September 1983.

Remedial Actions by EPA

EPA performs remedial actions at toxic waste sites in accordance with the Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA) of 1980, which was amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. In most instances, these actions are undertaken in three major phases. First, a remedial investigation and feasibility study (RI/FS) is conducted to determine the nature and extent of the contamination present at the site, and to develop and evaluate a range of remedial action alternatives to deal with that contamination. After the RI/FS is completed, a Record of Decision (ROD) is prepared to document the remedy selected. Subsequently, the remedial design (RD) phase begins, followed by the remedial action (RA), during which the design is implemented.

In addition to these scheduled activities, a removal action may be taken at any time to address acute hazards posed by a site.

Remedial Investigation

In accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA conducted a RI/FS at the Reich Farm site. Sampling of ground water and surface and subsurface soils at the site, in addition to potable well sampling off-site, was performed in May and June of 1986 as part of a preliminary remedial investigation. The formal field work for the supplemental remedial investigation, which was undertaken to provide additional data on site conditions, began in July 1987 and was completed in April 1988. Major contaminants in the soils and ground water are listed in Table 1, which includes data from each round of sampling conducted as part of a remedial investigation.

During the preliminary RI, the shallow soils on-site were investigated by the collection and analysis of 80 soil samples from 25 boreholes. Common sampling depths were 5, 10 and 15 feet. The supplemental RI soil sampling program, conducted in 1987, included 27 soil borings and 8 well borings. Analytical samples were generally taken from 15-35 feet below ground to supplement the previous sampling. Although there were some volatile and semi-volatile organics detected in the soils above a 10 foot depth, their concentrations did not exceed the existing cleanup levels established by NJDEP of 1 part per million (ppm) of total volatile organics and 10 ppm of total semi-volatile organics. These levels are known as the New Jersey Soil Action Levels and are shown for comparison in Table 1 (parts A and B). The concentrations of total volatile organics and total semi-volatile organics in certain areas (referred to as "hot spots") of the soil below a 10 foot depth did exceed their respective criteria. The level of nickel in one soil sample exceeded the action level of 100 ppm. No other inorganics were detected in the soil at concentrations above their criterion.

Ten monitoring wells were installed on-site and sampled as part of the preliminary RI. These wells were screened from 25 to 125 feet below the surface. Twelve additional on-site monitoring wells were installed, and all monitoring wells were sampled, during the supplemental RI. Nine residential wells in the area and ten Toms River Water Company wells were sampled in 1986 as part of the preliminary RI. One of the residential wells and three of the municipal wells were resampled during the supplemental RI in 1987. The analytical results for all of these ground water sampling events are shown in Table 1 (parts C and D) along with the applicable or relevant and appropriate requirements (ARARs) established by EPA or NJDEP.

The State ARARs for the various inorganic chemicals listed in Table 1 (parts C and D) are known as the State of New Jersey Maximum Contaminant Levels (MCLs) for "A-280" contaminants. Nickel, lead and cadmium were the only inorganics which exceeded these levels in the ground water sampling.

During the preliminary RI, the ten monitoring wells in place at that time were tested for metals. Nickel was detected in only one of these wells. The level detected in this monitoring well, which was located upgradient of the site, was above the New Jersey MCL for nickel (13.4 parts per billion (ppb)). Five of the original ten monitoring wells, including one upgradient well, were resampled for metals in November 1987 as part of the supplemental RI. Nickel was detected at concentrations exceeding the New Jersey MCL in all five of these wells. Two off-site wells which were sampled for metals in 1986 also showed nickel above the New Jersey MCL.

Lead was detected at a level of 56 ppb in TRWC's Dugan Lane monitoring well and at 58 ppb in TRWC's well number 20. These samples were taken in May 1986 as part of the preliminary RI. The state and federal cleanup levels are both currently set at 50 ppb for lead. Lead was not detected above this level in any monitoring wells on-site, or in any other off-site wells sampled.

Cadmium was detected above its New Jersey MCL in one upgradient monitoring well, and in TRWC's Dugan Lane monitoring well, during sampling in 1986. Cadmium was also detected above the EPA Drinking Water One Day Health Advisory in a residential well sampled in June 1986. This well was not used for drinking water at the time and is now out of use. Cadmium was not detected in any of the other 1986 samples, nor was it detected in 1987. Five of the monitoring wells sampled in 1987 showed concentrations of chromium above the New Jersey Pollution Discharge Elimination System (NJPDES) criteria of 50 ppb. One of these wells was located upgradient of the site. This was the only well in which chromium was detected during the 1986 sampling.

The labels on the drums found on the site, and the waste descriptions provided by UCC, did not indicate that metals were disposed at Reich Farm. Also, the randomness of the nickel, lead, cadmium and chromium detections, and the fact that nickel, cadmium and chromium were detected in upgradient wells and lead was not detected in any on-site wells, seem to indicate that Reich Farm is not the source of these metals in the ground water.

Iron and manganese were detected above their respective Federal Safe Drinking Water Act secondary standards in a number of ground water samples. These standards relate to the aesthetic quality of drinking water (i.e., odor and taste) and do not indicate a potential health risk.

The compounds, 1,2-dichloroethane and carbon tetrachloride, were detected at concentrations slightly above their respective New Jersey MCLs in only a small number of samples. 1,2-dichloroethane was detected in one out of 45 monitoring well samples and was not detected in any off-site wells; carbon tetrachloride was detected in one monitoring well sample and one residential well sample. This residential well did not show any carbon tetrachloride when it was resampled by the Ocean County Board of Health in 1988. The presence of these compounds in the ground water is not considered significant because of the limited number of detections and the low concentrations which were measured.

Methylene chloride (MC) was detected in four out of 30 monitoring well samples. All of these detections were at concentrations above the New Jersey MCL for this compound. Due to the small number of detections, and the fact that MC is a typical field and laboratory contaminant, the MC found in the ground water was not thought to be site related. Additional sampling will be necessary to determine the true source of this compound. After the results of this sampling are known, any ground water treatment to be undertaken at the site can be adjusted, if necessary.

The volatile organic compounds, 1,1,1-trichloroethane (TCA), trichloroethene (TCE) and tetrachloroethene (PCE), exceeded their respective New Jersey MCLs in a number of wells sampled in 1986 and 1987. These wells were all screened from 30-55 feet below the surface in the upper portion of the Kirkwood-Cohansey aquifer system. Two of TRWC's wells which are screened in this portion of the aquifer system showed levels of TCE slightly above the New Jersey MCL when sampled in May and June of 1986. One of these wells was resampled in November 1987 and showed the same level of

TCE as in the previous sample. TRWC's Dugan Lane monitoring well, which lies between the Reich Farm site and the Parkway Wellfield, did not show any TCE contamination when sampled in 1986 or 1987.

Contaminant Pathways and Associated Health Risks

A public health evaluation (PHE) was performed at the Reich Farm site to determine the impact of the site on public health and the environment under various exposure scenarios and different contaminant pathways. This evaluation is presented in Section 6 of the Supplemental Remedial Investigation report. The PHE identified 13 indicator chemicals in accordance with the Superfund Public Health Evaluation Manual and documented the existence of two contaminated media -- soil and ground water. These chemicals were all detected at levels higher than background concentrations. They are as follows: acetone, bis(2-ethylhexyl)phthalate (BEHP), chlorobenzene, di-n-butyl phthalate, 1,1-dichloroethane, 1,2-dichloroethene, ethylbenzene, styrene, PCE, toluene, TCA, TCE, and xylene. Although only two contaminated media were identified, the potential exists for migration of the contaminants into other exposure media, such as air and surface water, which were both included in the RI.

The PHE involves four steps. The first step is to identify indicator chemicals to address the potential public health and environmental concerns associated with the site. The next step is to use available data on the toxicity of each chemical to determine whether the contaminants present at the site may be associated with adverse health and/or environmental effects. The third step identifies likely exposure scenarios and defines the individuals who may be at risk via these exposure scenarios, as well as the most likely indicator compound concentrations associated with these scenarios. The PHE at Reich Farm used the maximum concentration of each indicator chemical detected in the soil and ground water. The final step in the process is the calculation of potential risks associated with exposure to indicator chemicals.

In the PHE, individual contaminants were separated into two categories of chemical toxicity depending on whether they cause carcinogenic or non-carcinogenic effects. In the case of chemicals exhibiting carcinogenic effects, exposures and associated risks are expressed in an exponential nomenclature; 1 X 10-4 (one in ten thousand), 1 X 10-7 (one in ten million), etc. EPA has used the range of 1 X 10-4 to 1 X 10-7 in evaluating risk. The level of 1 X 10-6, one in a million, has often been used by regulatory agencies as a benchmark. For chemicals exhibiting non-carcinogenic effects, exposures and associated risks are expressed as a ratio. This ratio, called a Hazard Index, is estimated by dividing the amount of a chemical that an individual might be exposed to by the amount of the chemical that will not cause any adverse health effects. A hazard index that is less than 1.0 indicates that no adverse health impacts would be expected.

A summary of the potential risks posed by each pathway evaluated in the PHE is given in Table 2.

The potential for significant exposure through dermal contact with and incidental ingestion of site soils by trespassers is considered low due to the activities of the construction company which presently occupies a portion of the site. In addition, this direct pathway represents a small potential health hazard since the RI findings indicate that the surface soils are not significantly contaminated because of the past excavation activities at the site. As was previously noted, the levels of contaminants found in the surface soils did not exceed the existing soil action levels established by NJDEP. The PHE showed that none of the indicator compounds would pose a risk via this exposure pathway.

Three migration pathways may exist for the transport of contaminants from the soils to the air: volatilization from the surface soils, volatilization due to on-site trenching activities, and resuspension of the soils through wind erosion or mechanical disturbances. All of these pathways were evaluated in the PHE. It was found that they do not represent a risk to human health due to the low levels of volatile organics in the surface soils.

Soil contaminants may also migrate into surface water by overland flow. Surface runoff at the Reich Farm site is an unlikely transport route for three reasons. First, the nearest stream or runoff channel is approximately 0.75 mile from the site. Second, the site is fairly level with only a minimal surface gradient. Third, the soil is predominantly sandy and is thus highly permeable following precipitation. During both the preliminary and supplemental RIs, there was no evidence of soils transported via surface runoff in the wooded areas adjacent to the property. For these reasons, the risk from exposure to contaminated surface waters was not evaluated in the PHE.

The ground water underlying the Reich Farm site is not currently used as a source of drinking water; therefore, at this time, it poses no risk to human health. The risk posed by the potential future ingestion of the ground water on-site was evaluated in the PHE and will be presented later in this discussion. In regard to the ground water in the vicinity of the site which is used as a potable water source, the analyses performed on residential wells in the area gave no evidence that Reich Farm is currently impacting private drinking wells; in addition, samples of on-site wells screened in the lower portion of the Kirkwood-Cohansey aquifer system showed no signs of contamination. Therefore, it appears that nearby residents using this portion of the aquifer system are not currently being affected by the Reich Farm site.

Ground water samples from the municipal water supply in the area (TRWC), which were collected during the RIs, indicated low levels of TCE, slightly above the New Jersey MCL of 1 part per billion, in a number of the wells in the Parkway Wellfield. TRWC has also detected low levels of TCE during its sampling of the Parkway Wellfield pumping wells. An air stripper has been installed on the well showing the highest levels of TCE (14 ppb is the highest level detected thus far) to treat the ground water to below the New Jersey MCL. This stripper is capable of treating compounds other than TCE and can also handle the water from more than one production well. Consequently, at present, there is no health risk associated with drinking water from the Parkway Wellfield.

There is not enough evidence available to either link Reich Farm with the contamination at TRWC's Parkway Wellfield, or to rule out Reich Farm as the source. Preliminary modeling efforts conducted during the supplemental remedial investigation have indicated that Reich Farm is in the zone of influence of the Parkway Wellfield. This means that the ground water leaving Reich Farm will likely be collected by the wellfield at some point in time. Yet, there is no definite pattern of contamination which links Reich Farm with the Parkway Wellfield. Further work will be required to delineate the leading edge of the ground water contaminant plume originating from the Reich Farm site. These efforts will include the sampling of any wells between Reich Farm and the Parkway Wellfield which were not sealed in 1974, and, if necessary, the installation and sampling of additional monitoring wells in this area.

Another exposure scenario which was evaluated in the PHE is the potential future ingestion of the ground water on-site. The PHE found TCE, PCE, BEHP, and acetone to be compounds of concern for this scenario. BEHP and acetone were determined to pose a significant risk because both were found at extremely high concentrations in separate ground water samples. This had a significant effect on the risk calculation because the calculation was based on the maximum concentration at which each indicator compound was detected.

The maximum acetone concentration of 74,000 ppb must be questioned due to the infrequency of acetone detections in the ground water sampling (7 detections in 26 samples) and the difference between this value and 690 ppb, the next highest concentration detected. Based on the results of the PHE, ingestion of 690 ppb of acetone in the ground water would not pose a significant health risk. At the present time, there are no ARARs governing the presence of acetone in ground water. The health protective level calculated in the PHE for acetone was 3.5 ppm.

The maximum concentration of BEHP detected in the ground water was 2200 ppb, which is significantly higher than the next highest detection of 95 ppb and its solubility at 20 degrees Centigrade (1300 ppb). Since a compound's solubility represents the highest concentration that it is likely to attain in the ground water, the maximum BEHP detection should be considered an anomaly. The Clean Water Act water quality criteria for human health which has been adjusted for drinking water, is 21 ppm for BEHP. This is considerably higher than the health protective level determined in the PHE (25 ppb). The large difference in these two values is a result of new information on the health risk posed by the ingestion of BEHP. This information was used in the PHE, but was not available at the time the water quality criteria was developed.

Acetone and BEHP are typical field and laboratory contaminants which may account for the high concentrations detected. Additional sampling will be required to determine if acetone and BEHP are truly present in the ground water at concentrations above health protective levels. If the sampling indicates that this is the case, any ground water treatment undertaken at the site will need to address the removal of these compounds.

Another significant migration route at Reich Farm is contaminant transport from the subsurface soils to the ground water. The sandy soils on-site will allow extensive percolation of rain water and surface discharge water through the contaminated zone. The maximum concentration that a contaminant, which is currently present in the soil, can eventually attain in the ground water, was calculated in Section 5 of the supplemental RI report for the volatile organics -- ethylbenzene, chlorobenzene, toluene, styrene and xylene. These values were then used in the PHE to determine the individual risks that these contaminants would pose via the ground water exposure scenarios. It was found that ethylbenzene and chlorobenzene would pose a significant health risk if they attain their maximum concentrations in the ground water and if this water was then used for drinking purposes.

This type of analysis was not done for any semi-volatile organic because the semi-volatile showing the highest levels in the soil (BEHP) is also currently present in the ground water. It was decided that the risk posed by the BEHP in the ground water would be evaluated and then used to indicate the potential risk posed by this compound and, in turn, the other semi-volatiles in the soil. Although the highest level of BEHP found in the ground water is considered an anomaly, the number of detections (18 detections in 44 samples) seems to indicate that BEHP has indeed reached the ground water at some level. If BEHP continues to migrate from the soil, it is likely that it will eventually pose a health risk in the ground water based on the low health protective level calculated in the PHE for the ingestion of BEHP in ground water (25 ppb).

The migration of contaminants from the ground water into the air is not considered likely based on the RI findings, although a possible inhalation pathway could exist in a situation where contaminated water is being used in a household shower. This usage could cause some organic contaminants to volatilize, thus allowing them to be inhaled. This pathway was assessed in the PHE and was not found to cause a significant risk.

Although no environmental assessment was performed for the Reich Farm site, it does not appear that the site poses a significant risk to the local flora or fauna. A large portion of the ground water contamination at Reich Farm consisted of low-molecular weight volatile organic compounds which do not represent a toxic potential and/or bioconcentration potential for stream biota. In fact, if ground water contaminated with volatiles entered the intermittent stream which is located less than a mile from the site, the volatiles would volatilize rapidly into the air before impacting the biota. The wooded areas surrounding Reich Farm provide ample cover and food for terrestrial fauna. The PHE did not find any of the exposure pathways to the soils on-site to pose a significant risk. In addition, activites associated with the companies on-site are probably sufficient to keep most terrestrial fauna in the wooded areas.

ENFORCEMENT ACTIVITIES

Three potentially responsible parties (PRPs) were identified for the Reich Farm site. All of the PRPs were notified in writing on October 3, 1983 and given the opportunity to perform the RI/FS under EPA supervision. However, none of them elected to undertake these activities. After the RI/FS was completed, a 30-day public comment period was provided, ending on September 19, 1988. Upon request, this deadline was extended to September 22, 1988 for two of the identified PRPs. It is anticipated that Special Notice letters will be sent out to the previously identified PRPs updating the status of the site and providing them with the opportunity to perform the remedial design and remedial action phases of the project.

COMMUNITY RELATIONS ACTIVITIES

A Community Relations Plan for the Reich Farm site was finalized in July 1983. This document lists contacts and interested parties throughout government and the local community. It also establishes communication pathways to ensure timely dissemination of pertinent information.

A public meeting was held on January 29, 1986 to discuss the work plan for the preliminary RI and to inform the public about the Superfund program and the history and status of the site. EPA finalized the work plan for the supplemental RI/FS in September 1987 and placed this document in the three information repositories established for the site. Upon completion of the RI/FS reports, they were sent to the repositories to initiate the public comment period, which extended from August 17, 1988 to September 19, 1988. A public meeting was held on August 30, 1988 to present the results of the RI/FS and the preferred remedial alternative for the site developed by EPA. All comments which were received by EPA before the end of the public comment period, including those which were submitted verbally at the public meeting, are addressed in the Responsiveness Summary which is attached, as Appendix 1, to this document.

REMEDIAL OBJECTIVES

The remedial alternatives presented in this document are based on the findings of the remedial investigations at the site and focus on contamination of the ground water by 1,1,1-trichloroethane (TCA), trichloroethene (TCE) and tetrachloroethene (PCE), and of the soil by volatile and semi-volatile organic contaminants. Alternatives addressing cleanup of the ground water will be presented separately from those dealing with soil remediation.

In general, ARARs are promulgated and legally enforceable to address a specific contaminant (such as TCE), specific location (such as a wetland), or specific action (such as air stripping). Contaminant specific ARARs can be applied to the RI results before any remedial alternatives are developed. The federal and state ARARs which have been established for ground water are presented in Table 1 (parts C and D). If available technologies exist that can meet or exceed the most stringent ARARs, these standards are used to develop the cleanup objectives (criteria) for the site remedy.

The MCLs established by the State of New Jersey, which are more stringent than the federal standards for TCA, TCE and PCE are as follows: 26 parts per billion (ppb) for TCA, 1 ppb for TCE, and 1 ppb for PCE. These compounds were all detected above these criteria in a number of ground water samples. Therefore, removal of these compounds from the ground water is considered an objective of the cleanup. The New Jersey MCL for MC is 2 ppb. Although MC was detected above this level in a small number of ground water samples, these detections are thought to be a result of field or laboratory contamination. Consequently, removal of MC from the ground water is not considered a remedial objective. Additional sampling must be performed to determine the source of the MC which was detected. If this sampling indicates that MC is indeed a ground water contaminant at Reich Farm, any ground water remediation undertaken at the site will address reduction of the concentration of MC in the ground water to levels below the New Jersey MCL.

In addition to attaining the most stringent ARARs, the reduction of the concentrations of all contaminants to health protective levels is another objective of the site remedy. The PHE conducted at the Reich Farm site showed acetone and BEHP to be contaminants of concern in the ground water. The health protective levels which were calculated for these contaminants are 25 ppb for BEHP and 3.5 ppm for acetone. One acetone sample and two BEHP samples exceeded these levels. Due to the questionable nature of the BEHP and acetone detections in the ground water, cleanup of these compounds is not presently considered a remedial objective but additional sampling is necessary to determine the true magnitude of BEHP and acetone contamination in the ground water. This additional sampling should be conducted at the intiation of the design of the site remedy. If this sampling indicates that the concentrations of BEHP and acetone exceed their respective health protective levels, clean up to these levels will then be considered a remedial objective of the site remedy.

At this time, no ARARs exist for remediation of soil contaminated with organics. However, NJDEP has developed soil action levels of ½ ppm of total volatile organics and 10 ppm of total semi-volatile organics. These levels will be used as cleanup objectives for the soil remediation aspect of the site remedy. The PHE determined that the only health risk which may result from the contaminated soils on-site involves the migration of contaminants into the ground water. It is believed that cleanup to the NJDEP action levels will help ensure that this migration is prevented.

Table 3 summarizes the influencing factors in the selection of remedial objectives for cleanup of the Reich Farm site.

REMEDIAL ALTERNATIVES

This section describes the remedial alternatives which were developed, using suitable technologies, to meet the objectives of the National Oil and Hazardous Substances Contingency Plan and the Superfund Amendments and Reauthorization Act. These alternatives were developed by screening a wide range of technologies for their applicability to site-specific conditions and evaluating them for effectiveness, implementability, and cost.

A comprehensive list of candidate remedial technologies was compiled to characterize each technology and determine its applicability to the site. The original list for ground water remediation is included as Table 4. The soil remedial technologies are listed in Table 5. Each table also provides a brief rationale as to why a particular technology was excluded from further consideration. The technologies that were retained after the preliminary screening process were assembled in various combinations to form four ground water alternatives and six soil alternatives.

The components of each of the ground water and soil alternatives developed for the Reich Farm site are described below and the present worth cost estimates for these alternatives are listed in Table 6. Alternatives addressing cleanup of the ground water will be presented separately from those addressing soil remediation to maintain consistency with the Feasibility Study report and the Proposed Remedial Action Plan. Ground water alternatives are prefixed with GW and soil alternatives with S.

GROUND WATER ALTERNATIVES

ALTERNATIVE GW-1: NO REMEDIAL ACTION

This alternative would not directly address or reduce site contamination and its associated risks. Under current site conditions, contaminant movement and dispersion should continue to follow the path of natural ground water flow, which may significantly impact water quality south-southwest of the site. Therefore, a comprehensive ground water sampling program would be implemented to track the movement of the contaminant plume. The monitoring wells on-site would be sampled every six months and analyzed for priority pollutants until the ground water plume is attenuated to health based levels.

ALTERNATIVE GW-2: PUMP/TREAT USING AIR STRIPPING AND CARBON ADSORPTION/REINJECT TREATED GROUND WATER

Under Alternative GW-2, extraction wells would be installed to withdraw contaminated ground water for treatment. The placement of these extraction wells would be determined after additional ground water sampling. This sampling would be conducted as part of the remedial design and would serve to delineate the full downgradient extent of the contaminant plume originating from the Reich Farm site. Any existing wells located downgradient of the site would be sampled; if additional information is necessary, new monitoring wells would be installed in this area. The extraction wells would then be placed so that they would most effectively and efficiently capture the plume. Based on the known extent of the contaminant plume, the ground water would need to be extracted at a rate of approximately 60 gallons per minute in order to capture the entire plume.

The extracted ground water would be treated via air stripping followed by carbon adsorption. Air stripping involves injecting heated air into contaminated water and extracting the off-gases, which contain the volatile organics that were removed from the ground water, by pumping. In this treatment scheme, the carbon adsorber which follows the air stripper is used as a "polishing unit" to remove any trace volatile organics, and any semi-volatile organics which remain in the ground water. Treatability studies performed during the remedial investigation have shown this treatment method to be capable of removing the contaminants of concern from the ground water. The emissions from the air stripper would be monitored and, if necessary, the off-gases would be treated by a vapor phase carbon filter before they are released to the atmosphere to ensure that all air emission standards are attained. The treated ground water would be discharged to injection wells upgradient of the site. In order to evaluate the performance of this remedial action, sampling and testing of the ground water before and after treatment would be required. This type of performance monitoring would also be necessary for all of the ground water treatment alternatives described below.

ALTERNATIVE GW-3: PUMP/TREAT USING CARBON ADSORPTION/REINJECT TREATED GROUND WATER

This alternative uses the same pumping system as Alternative GW-2. The ground water would be treated via two granular activated carbon adsorbers placed in series. In this type of treatment, the contaminated ground water is passed through a bed of carbon. The contaminants leave the ground water and are adsorbed onto the surface of the carbon particles. When the carbon particles become saturated with the contaminants, they must be replaced. A pilot test would be conducted to determine the frequency of change of the activated carbon. The spent carbon would be collected by the equipment supplier and shipped for off-site disposal or for treatment and reuse. The efficiency of each adsorber to remove the contaminants from the ground water is a function of the size of the carbon bed. The reinjection scheme for this alternative would also be the same as described for Alternative GW-2.

ALTERNATIVE GW-4: PUMP/TREAT USING H2O2-UV OXIDATION/REINJECT TREATED GROUND WATER

This alternative is similar to Alternative GW-2 except that the contaminated ground water would be treated by chemical oxidation instead of air stripping. This chemical oxidation employs a combination of hydrogen peroxide (H2O2) and ultraviolet (UV) light to chemically oxidize the volatile organic contaminants in the ground water. The oxidation process converts the volatile organics to carbon dioxide, water, and non-hazardous salts. The contaminant removal efficiency of the unit is a function of the length of time that the ground water is retained in the oxidation chamber. The carbon adsorber would serve the same function as in Alternative GW-2. The pumping and reinjection scheme would be the same as described in Alternative GW-2.

SOIL ALTERNATIVES

The following soil alternatives, with the exception of no action, involve the remediation of "hot spots" in the subsurface soils. An area was designated as a "hot spot" if the concentration of contaminants in the soil exceeded the New Jersey soil action levels. For those alternatives which involve treatment, the amount of soil requiring remediation is estimated. Testing will be performed during the remedial action to ensure that all soils with contaminant concentrations above the action levels are treated.

ALTERNATIVE S-1: NO REMEDIAL ACTION

The no action soil cleanup alternative consists of a long-term monitoring and control program. Warning signs will be posted at the site to alert the community of the presence subsurface soil contamination. A long-term monitoring program would be implemented to assess the extent of contaminant migration into the ground water and to detect upward migration of volatile organic contaminants in the soil. The condition of the warning signs would also be checked. The monitoring program would include, annual inspection of the facilities, and sampling and testing of the ground water and soil every six months. The ground water sampling can be performed using existing monitoring wells. The soil sampling would be conducted in the areas containing high levels of contamination. This alternative would not prevent the migration of contaminants from the soil to the ground water.

ALTERNATIVE S-2: CAPPING OF HOT SPOTS/INSTALLATION OF GROUT CURTAINS

In this alternative, a multi-layer cap would be placed over each hot spot. A grout curtain would then be injected around the perimeter of each area. The grout curtain would extend down to the water table located 30 feet below the surface. The cap would consist of a synthetic liner, a sand layer, a layer of crushed stone, a layer of coarse aggregate bituminous concrete, and a layer of fine aggregate bituminous concrete. The grout curtain is made of cement mixed with bentonite, soil and water. The cap and grout curtain would serve to isolate each hot spot and thus prevent percolating water from aiding the migration of contaminants into the ground water. A long-term monitoring program would be implemented as part of this alternative and would consist of inspecting the grout curtain and cap, and sampling and testing of the ground water (using the existing monitoring wells) every six months. This sampling would be performed in order to detect any contaminant release from the capped areas.

ALTERNATIVE S-3: SOIL EXCAVATION/ON-SITE INCINERATION/ON-SITE PLACEMENT OF TREATED SOIL

This alternative would involve excavation of approximately 2620 cubic yards of soil, 2010 cubic yards of which are subsurface soils requiring treatment. The remaining 610 cubic yards are surface soils which are not significantly contaminated. These soils would be stored and eventually used to backfill the excavated areas. The contaminated soil would be treated in a mobile incinerator brought to the site. All contaminants of concern in the soil would be destroyed by the incineration process. The incinerator system would contain an air pollution control device which would collect any off-gases produced and treat them for particulate and acid gas removal before release to the atmosphere. The treated soil would be tested to ensure that the remedial objectives have been achieved and would then be used as backfill in the excavated areas. The vendor providing the equipment would be responsible for disposal of particulates and acid gas collected in the air pollution system, and any waste water which was used.

ALTERNATIVE S-4: SOIL EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

The extent of soil excavation for this alternative would be the same as described in Alternative S-3. The 2010 cubic yards of contaminated soil would be transported off-site to a RCRA permitted facility for treatment and disposal. Two facilities in New Jersey have tentatively indicated that they are capable of handling this material. Both facilities are equipped to incinerate the soil. The facilities are approximately fifty miles from the site. It is estimated that one hundred 20-ton trucks would be required to transport the total volume of soil. Clean fill, and the surface soils which were excavated, would be used as backfill.

ALTERNATIVE S-5: SOIL EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE PLACEMENT OF TREATED SOIL/OFF-SITE TREATMENT AND DISPOSAL

In this alternative, approximately 1480 cubic yards of soil would be excavated intially, 1120 cubic yards of which are subsurface soils contaminated with volatile organics. The remaining 360 cubic yards are surface soils which would be stored temporarily and later used as backfill in the excavated areas. The volatile organic contaminated soil would be treated on-site via enhanced volatilization. In this process, hot air is injected into a thermal processor (rotary dryer) containing the soil to be treated. The volatile organics in the soil volatilize into the air stream and combust in an afterburner, where they are destroyed. The off-gases from the afterburner are then treated in a scrubber for particulate and acid gas removal. The afterburner can be replaced with a carbon adsorber to remove the volatiles from the air stream. The carbon would then be disposed of, or regenerated, at an off-site facility. In this case, no scrubber would be needed. After testing to ensure that the level of total volatile organics in the soil is below 1 ppm, the treated soil would be used to backfill the excavated area.

The second stage of this alternative involves excavating about 1140 cubic yards of soil, 890 cubic yards of which are contaminated with semi-volatile organics. Some semi-volatile organics may not be adequately removed from soil by enhanced volatilization; therefore, this soil would be taken off-site for treatment (via incineration) and disposal. The area of this excavation would be backfilled with clean fill and the 250 cubic yards of surface soil which were excavated but did not require treatment.

The volume of soil requiring off-site treatment (890 cubic yards) is a conservatively high estimate. This value was used to yield a conservative cost estimate for this alternative because off-site incineration is a more expensive treatment method than enhanced volatilization. A treatability study would be required to determine the actual amount of soil which can be successfully treated by enhanced volatilization. It is likely that enhanced volatilization would be a viable treatment method for a large percentage, or perhaps all, of the contaminated soil; thus, decreasing the cost significantly.

ALTERNATIVE S-6: IN SITU VACUUM EXTRACTION/SOIL EXCAVATION/ OFF-SITE TREATMENT AND DISPOSAL

In situ vacuum extraction involves the installation of wells at a depth of approximately 20 feet in those areas of the soil which are contaminated with volatile organics. The wells are then connected via a pipe system which is attached to a vacuum pump. The vacuum pulls air through the contaminated soils. This air, containing the volatile organics which were removed from the soil, is then fed to a unit to remove the volatiles. Excavation is not required for this stage of Alternative S-6.

The second stage of this alternative would involve the treatment of 1120 cubic yards of soil. The treatment method is the same as for the second stage of Alternative S-5, because vacuum extraction also is not an effective technology for the removal of semi-volatile organics from soil. There is a difference in the volume of soil to be treated as compared to the second stage of Alternative S-5 because enhanced volatilization is capable of removing some of the semi-volatile organics present in the soil which cannot be removed by the in situ vacuum extraction process.

Evaluation of Alternatives

Persuant to CERCLA, as amended, EPA must evaluate each alternative with respect to nine criteria. These criteria were developed to address the requirements of Section 121 of SARA. The nine criteria are: short-term effectiveness, long-term effectiveness and permanence, reduction of toxicity, mobility and volume, implementability, cost, attainment of ARARs, protectiveness, state acceptance, and community acceptance. The discussion which follows provides an analysis, relative to these criteria, of all of the alternatives under consideration for cleanup of the ground water and soil at the Reich Farm site.

Short-Term Effectiveness

The short-term effectiveness criterion involves the period of time each alternative needs to achieve protection and any adverse impacts on human health and the environment that may be posed during construction and implementation of the alternative.

GROUND WATER ALTERNATIVES:

Alternative GW-1 would take approximately one month to implement and presents no short-term risks to on-site workers or the community, however, it provides little or no protection.

Alternatives GW-2, GW-3 and GW-4 present minimal short-term risks to workers through direct contact pathways with contaminated water resulting from piping leaks, and normal construction hazards during remedial action. Alternative GW-2 presents a small additional risk due to emissions from the air stripper. This risk would be addressed by monitoring to ensure that the air emission standards are not exceeded. Each of these alternatives would take approximately eleven years to implement and would achieve full protection at the end of that time. This implementation time is based on no remedial action being taken for the soils on-site. Any remedial action addressing the contaminated soils would decrease the implementation time for the ground water alternatives.

SOIL ALTERNATIVES:

Alternative S-1 would take one month to implement and presents no short-term risks to on-site workers or the communtity; it does not achieve full protection.

Alternative S-2 can achieve full protection against the contaminants of concern within a one year period and presents minimal short-term risks to workers during remedial action through direct contact pathways and the normal hazards associated with the construction of the containment system. These hazards would be addressed in a health and safety plan which would be developed for the construction activities.

Alternatives S-3, S-4 and S-5 would require one year, and Alternative S-6 would require two years, to achieve full protection. Alternatives S-3, S-4, S-5 and S-6 involve the excavation of contaminated soil and, consequently, would increase the short-term risk to human health due to increased direct contact pathways and construction hazards during excavation activities. As stated above, this concern would be addressed in the health and safety plan. In addition, Alternative S-3 involves on-site incineration which poses some risk of exposure to air emissions from the incinerator; these risks are minimized by the air pollution control device which is an integral part of the incinerator system.

Alternatives S-4, S-5 and S-6 would pose a minor short-term risk of exposure to the community during the transport of the soil to an off-site facility for treatment and disposal.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

GROUND WATER ALTERNATIVES:

Alternative GW-1 would present a long-term risk to the community if the contaminant plume migrates outside of the Cohansey (upper portion of the Kirkwood-Cohansey aquifer system) restricted private well area surrounding the Reich Farm site, or into the Kirkwood (lower portion of the Kirkwood-Cohansey aquifer system) which has fewer restrictions placed on its use as a potable well source. Alternative GW-1 would only track this migration through monitoring of on-site wells; it would not prevent it.

Alternatives GW-2, GW-3 and GW-4 present no long-term threat to public health because these alternatives clean up the aquifer to contaminant levels which are health protective. These alternatives utilize proven technologies (i.e., air stripping, carbon adsorption and UV-oxidation) which have been used frequently for treatment of industrial and hazardous waste. Alternatives GW-2 and GW-4 provide more flexibility than Alternative GW-3 in the types of compounds which can be successfully treated because they utilize more that one treatment technology. All of these alternatives are reliable and present no major operational problems provided proper maintenance is performed.

SOIL ALTERNATIVES:

In Alternative S-1, none of the contaminated soil on-site would be remediated; therefore, a significant risk of contaminant migration into the ground water would remain. The control program and warning signs which would be used in this alternative would restrict public access to the site; however, they are not reliable control methods. The long-term ground water monitoring program would track the migration of contaminants from the soil into the ground water, but would not prevent this migration. The warning signs and monitoring wells would need to be replaced if damaged.

Alternative S-2 would reduce the risk of contaminant migration into the ground water by containing the contaminated soil; however, if the containment system were to fail, this risk would again present itself. This alternative would require a long-term management program to detect any migration of contaminants into the ground water which would indicate that the containment system has failed. In addition, CERCLA requires that all alternatives which do not involve treatment of contaminated material must be reviewed and evaluated every five years. Alternative S-2 would fall under this provision.

Alternatives S-3, S-4, S-5 and S-6 would completely reduce the residual risks on the site since all significantly contaminted soil is removed, treated, or disposed of off-site. There is no need for long-term, on-site management for these alternatives because at the end of the implementation period, all of the contaminated soil has been remediated; thus, the soil to ground water contaminant migration route would be eliminated. For Alternatives S-3, S-5 and S-6, which involve on-site soil treatment, a quality control monitoring program would be required to ensure that the soil has met the remedial objectives after treatment is completed. Because Alternative S-6 is an in situ treatment, careful monitoring and additional sampling would be necessary to ensure that the system is meeting all performance standards.

. Reduction of Toxicity, Mobility or Volume

This evaluation criterion refers to the anticipated performance of the treatment technologies, with respect to these parameters, that a remedy may employ.

GROUND WATER ALTERNATIVES:

Alternative GW-1 would gradually reduce the toxicity, mobility and volume of the contaminated ground water through natural attenuation (i.e., contaminants in the ground water underlying the Reich Farm site would eventually adhere to the saturated soils) but would not prevent the migration of contaminants into potable well sources. There is no reliable means of calculating the time required for this natural flushing process to reduce the concentrations of the contaminants of concern in the ground water to health protective levels.

Alternatives GW-2, GW-3 and GW-4 would significantly reduce or completely eliminate the toxicity and volume of the contaminated ground water by treating it until it attains health protective levels. In the process, the potential for migration of the contaminated ground water is reduced.

SOIL ALTERNATIVES:

Alternatives S-1 and S-2 would provide no reduction of the mobility, toxicity or volume of the contaminants in the soil. Alternatives S-3, S-4, S-5 and S-6 would reduce the toxicity, mobility and volume of the contaminants on-site by treatment or off-site disposal.

Implementability

Implementability involves the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

GROUND WATER ALTERNATIVES:

Although the No Action alternative is the simplest to implement, based upon site conditions and the availability of land, all of the ground water alternatives can be implemented with no major construction difficulties, and in relatively short periods of time. The proposed treatment technologies and equipment required for Alternatives GW-2, GW-3 and GW-4 are available as prefabricated packages from a number of vendors. These packages can be installed as part of an on-site treatment plant.

SOIL ALTERNATIVES:

Alternative S-1 is the easiest soil alternative to implement. The required services and materials are readily obtained and no special pieces of equipment are needed. Alternative S-2 can also be readily implemented because standard construction equipment is used to install the containment system. Labor and materials are readily available for this alternative.

Alternatives S-3 and S-5 are relatively easy to implement because packaged mobile units, for incineration and enhanced volatilization, respectively, are available from several vendors. With respect to Alternative S-4, there are existing off-site facilities capable of handling the contaminated soil. This is true for all other alternatives which include off-site treatment (i.e., S-5 and S-6). Alternative S-6 uses a relatively new technology which may present more difficulty in implementation than any of the other alternatives. A packaged mobile in situ vacuum extraction unit is known to be available from one vendor. Pilot scale studies would be required for this alternative.

Cost

The cost of an alternative includes both capital and operation and maintainance (O&M) costs. Cost comparisons are made on the basis of present worth values. Present worth values are equivalent to the amount of money which must be invested to implement a certain alternative at the start of construction to provide for both construction costs, and O&M costs over time. Cost estimates for all of the alternatives can be found in Table 4.

GROUND WATER ALTERNATIVES:

Alternative GW-1 would be the least costly to implement, followed by GW-2, GW-3 and GW-4. The present worth value for each alternative is as follows:

Alternative GW-1:	$ 236,000
Alternative GW-2:	$3,916,000
Alternative GW-3:	$4,100,000
Alternative GW-4:	$5,722,000

SOIL ALTERNATIVES:

Again, the no action alternative is the least costly to implement, followed by Alternatives S-2, S-5, S-6, S-3 and S-4. The present worth value for each alternative is:

Alternative S-1:	$ 314,000
Alternative S-2:	$ 877,000
Alternative S-3:	$2,590,000
Alternative S-4:	$3,550,000
Alternative S-5:	$1,916,000
Alternative S-6:	$2,135,000

Compliance with ARARs

This criterion addresses whether or not a remedy will meet all applicable or relevant and appropriate requirements and/or provide grounds for invoking a waiver. ARARs can be contaminant specific, location specific, or action specific.

GROUND WATER AND SOIL ALTERNATIVES:

All alternatives except no action will meet all applicable or relevant and appropriate federal and state environmental laws.

Overall Protection of Human Health and the Environment

This criterion addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

GROUND WATER AND SOIL ALTERNATIVES:

Protection of human health and the environment is the central mandate of the Comprehensive Environmental Response, Compensation and Liability Act. Protection is achieved primarily by taking appropriate action to ensure that there will be no unacceptable risks to human health or the environment through any exposure pathways.

The alternatives evaluated, with the exception of no action, are protective of public health and the environment.

State Acceptance

The State of New Jersey has stated no objection to those alternatives which actively clean up contaminated soils and ground water.

Community Acceptance

GROUND WATER ALTERNATIVES:

Except for the no action alternative, the ground water alternatives are similar in their short-term and long-term effectiveness and in the amount of construction activity which will be required for implementation. Based on this, it seems that Alternatives GW-2, GW-3 and GW-4 should be equally acceptable to the community.

SOIL ALTERNATIVES:

It is likely that Alternative S-1 would be unacceptable to the public since it provides no protection from the migration of contaminants into the ground water. Alternative S-2 does not remove or treat the contaminated soil which may negatively influence public opinion. Alternative S-3 involves on-site incineration which has been historically unfavorable to local communities. In contrast, Alternative S-4 involves transport of contaminated soil off-site which has generally been the preference of local affected communities. Alternatives S-5 and S-6 both involve on-site treatment and the removal of soil, but Alterative S-5 can be implemented more quickly and involves the removal of a smaller amount of soil from the site which should make it more acceptable than S-6.

SELECTED REMEDY/STATUTORY DETERMINATIONS

The Environmental Protection Agency has been explicitly directed by Congress in Section 121 (b) of CERCLA, as amended, to select remedial actions which utilize permanent solutions and alternative treatment technologies or resource recovery options to the maximum extent practicable. In addition, the Agency is to prefer remedial actions that permanently and significantly reduce the mobility, toxicity or volume of site wastes.

After careful review and evaluation of the alternatives presented in the feasibility study as achieving the best balance of all evaluation criteria, EPA presented alternative GW-2, pumping contaminated ground water/treatment by air stripping and carbon adsorption/reinjection of the treated water, and S-5, excavation of contaminated soil/treatment by enhanced volatilization or off-site incineration/backfilling the soil which was treated on-site, to the public as the preferred remedy for the ground water and soil, repectively, at the Reich Farm site. The input received during the public comment period, consisting primarily of questions and statements submitted at the public meeting held on August 30, 1988, is presented in the attached Responsiveness Summary. Public comments received encompassed a wide range of issues but did not necessitate any major changes in the remedial approach taken at the site. Accordingly, the preferred alternatives were selected by EPA as the remedial solution for the site. Some additional activities will be performed during the initial phases of the remedial design process and prior to implementation of the selected remedial alternative. These activities are described and justified as follows:

- The high concentrations of methylene chloride, acetone and bis(2-ethylhexyl)phthlate detected in the ground water during the remedial investigation seem to be anomalies. Testing of on-site monitoring wells is necessary to determine whether these compounds are actually present in the ground water at concentrations above health protective levels. If sampling confirms these high levels, the treatment method chosen for the ground water can then be adjusted to address removal of these compounds to health protective levels. Air stripping can provide a high degree of removal of acetone and methylene chloride from the ground water, and carbon adsorption is an effective treatment method for BEHP. If necessary, the removal efficiency of the units can be adjusted during the design of the ground water treatment system to reflect the results of the sampling.

- Exact delineation of the downgradient extent of the contaminant plume has not been fully accomplished by the remedial investigations conducted at the site. Therefore, sampling of wells further downgradient than those sampled during the remedial investigations is warranted. This may be accomplished by sampling any existing downgradient wells which were not sealed as part of the 1974 Dover Township Health Department zoning ordinance. If there are not enough existing downgradient wells, additional monitoring wells will be installed and sampled.

- Additional sampling of the soils on-site to ensure that all soil with concentrations of organics above the New Jersey Soil Action Levels is remediated.

The costs associated with the selected alternative are itemized in Table 7. The major components of this action are as follows:

- Extracting contaminated ground water by pumping followed by on-site treatment through air stripping and carbon adsorption and reinjection of treated water into the ground. The treated water will be tested to ensure that the treatment method is meeting federal and state standards. Additional pre-treatment and post-treatment units may be required to remove any other contaminants detected in the ground water during final delineation of the plume. Any waste generated by these additional units will be treated to meet applicable disposal limits. The required treatment process will continue until federal and state cleanup standards are attained to the maximum extent that is technically practicable.

- Conducting an analysis of the contaminant concentration levels found in the exhaust gases emitted by the air stripping unit. This analysis will determine whether additional post-treatment units are required to meet national and state ambient air quality standards.
- Pilot scale testing of the enhanced volatilization unit to determine which compounds can be treated to meet the New Jersey Soil Action Levels by this method.
- Excavation, storage and backfill of surface soils on-site which do not require remediation.
- Excavation, staging, treatment by enhanced volatilization, and backfill of subsurface soils. Before backfilling, testing will be performed to ensure that contaminant concentrations in the treated soil are below the New Jersey Soil Action Levels.
- Excavation, on-site staging, and transportation off-site to a RCRA permitted facility for treatment and disposal, of subsurface soils with contamination which cannot be treated to below the action levels by enhanced volatilization.

PROTECTIVENESS

The selected site remedy protects human health and the environment by dealing effectively with the principle threats posed by the Reich Farm site. These principle threats involve the ingestion of volatile contaminants found in the ground water and the migration of contaminants from the soil into the ground water where they have the potential to cause a health risk. The selected alternative addresses these contaminant pathways by capturing and treating the contaminant plume and removing and treating the contaminated soil. The primary contaminants of concern in the ground water which were identified in the RI report are 1,1,1-trichloroethane, trichloroethene, and tetrachloroethene. The contaminants of concern in the soil include both volatile and semi-volatile organics.

PREFERENCE FOR TREATMENT

The statutory preference for treatment is satisfied by the selected remedy which employs on-site treatment of the ground water through air stripping and carbon adsorption. It also includes on-site enhanced volatilization for a portion of the contaminated soil and off-site incineration for the remaining contaminated soil. These treatment methods effectively reduce the toxicity, mobility and volume of the contaminants.

COST EFFECTIVENESS

Of the alternatives which most effectively address the principle threats posed by the contamination at the site, the selected alternatives afford the highest level of overall effectiveness proportional to their cost. The selected alternatives are cost-effective because they provide the highest degree of protectiveness among the alternatives evaluated while representing a reasonable value for the money.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedial actions utilize permanent solutions and alternative treatment technologies to the maximum extent praticable and provide the best balance among the nine evaluation criteria of all of the alternatives examined.

The ground water treatment will reduce the contaminants of concern to health protective levels. After treatment is complete, the ground water will no longer present a potential future risk to the public health; therefore, neither monitoring nor management will be required.

The soil treatment will prevent contaminants which are currently in the soil from migrating into the ground water where they may pose a potential health risk. Again, when this treatment is complete, no long-term monitoring or management will be required. In addition, no restrictions on the use of the site will be necessary.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Action-Specific

Materials on-site are not RCRA listed wastes based on current information. In addition, these wastes are not expected to be characteristic. Therefore, any ARARs pertaining to listed or characteristic wastes are not applicable to the Reich Farm site.

Under the Clean Air Act, the National Ambient Air Quality Standards (as contained in 40 CFR Parts 50.6, 50.7 and 50.12) are considered applicable federal requirements for limiting the concentration of particulate matter which may be emitted from the air stripping unit and the enhanced volatilization system in the selected remedial actions. The Ambient Air Quality Standards (NJAC 7:27-13) are considered an applicable state requirements. Relevant and appropriate state requirements include the emission standards provided in NJAC 7:27-6 (Control and Prohibition of Particulates from Manufacturing), and the substantive requirements for the operation of air pollution control equipment under NJAC 7:27-8 (Permits and Certificates).

Spent carbon from the ground water treatment system will be disposed of off-site consistent with applicable RCRA land ban requirements. The carbon may be regenerated which would also meet RCRA land ban requirements.

EPA has undertaken a land ban rulemaking that applies to soil and debris and which extends the time period for disposing of these materials. Therefore, the land ban is not considered relevant and appropriate at this time.

The reinjection process for the treated ground water will meet underground injection well regulations by its status as a Superfund remedial action. The extracted ground water will be treated to meet drinking water standards prior to reinjection.

RCRA closure requirements are relevant and appropriate for the treated soils which will be placed back on-site after the enhanced volatilization process. The clean-up levels which were selected for the soils are consistent with an alternative clean closure which will not require long-term management or engineering controls.

Any soil which is taken off-site for treatment and disposal will be brought to a RCRA permitted facility.

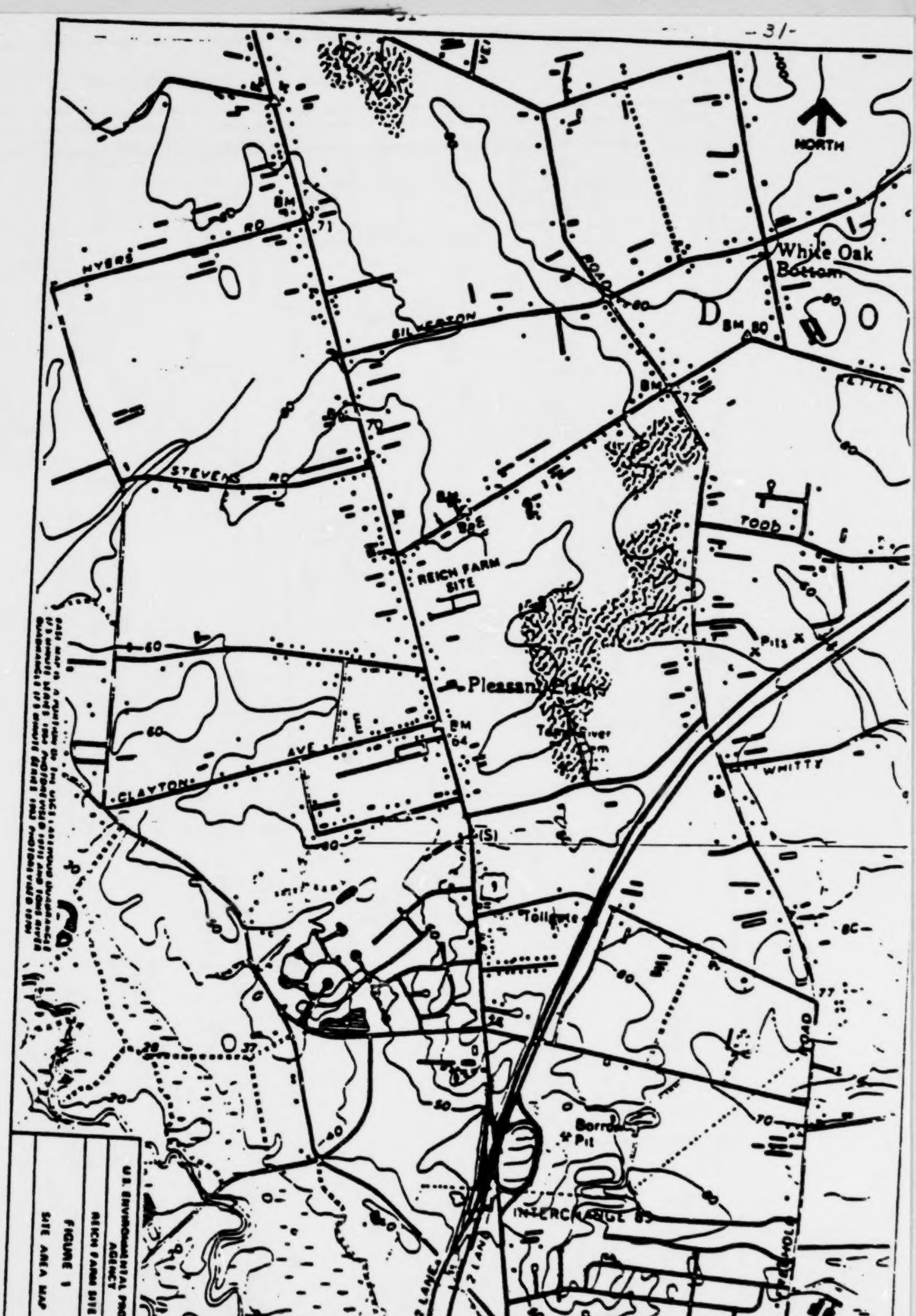
Contaminant-Specific

As outlined in Table 1, Parts B and C, the federal MCLs under the Safe Drinking Water Act are promulgated applicable requirements which limit the concentration of contaminants in the treated ground water which is to be recharged on-site through reinjection wells. The more stringent New Jersey MCLs would limit the concentrations in the treated effluent at the point of reinjection to levels of 26 ppb for TCA, 1 ppb for TCE and 1 ppb for PCE, the major contaminants in the ground water.

Location-Specific

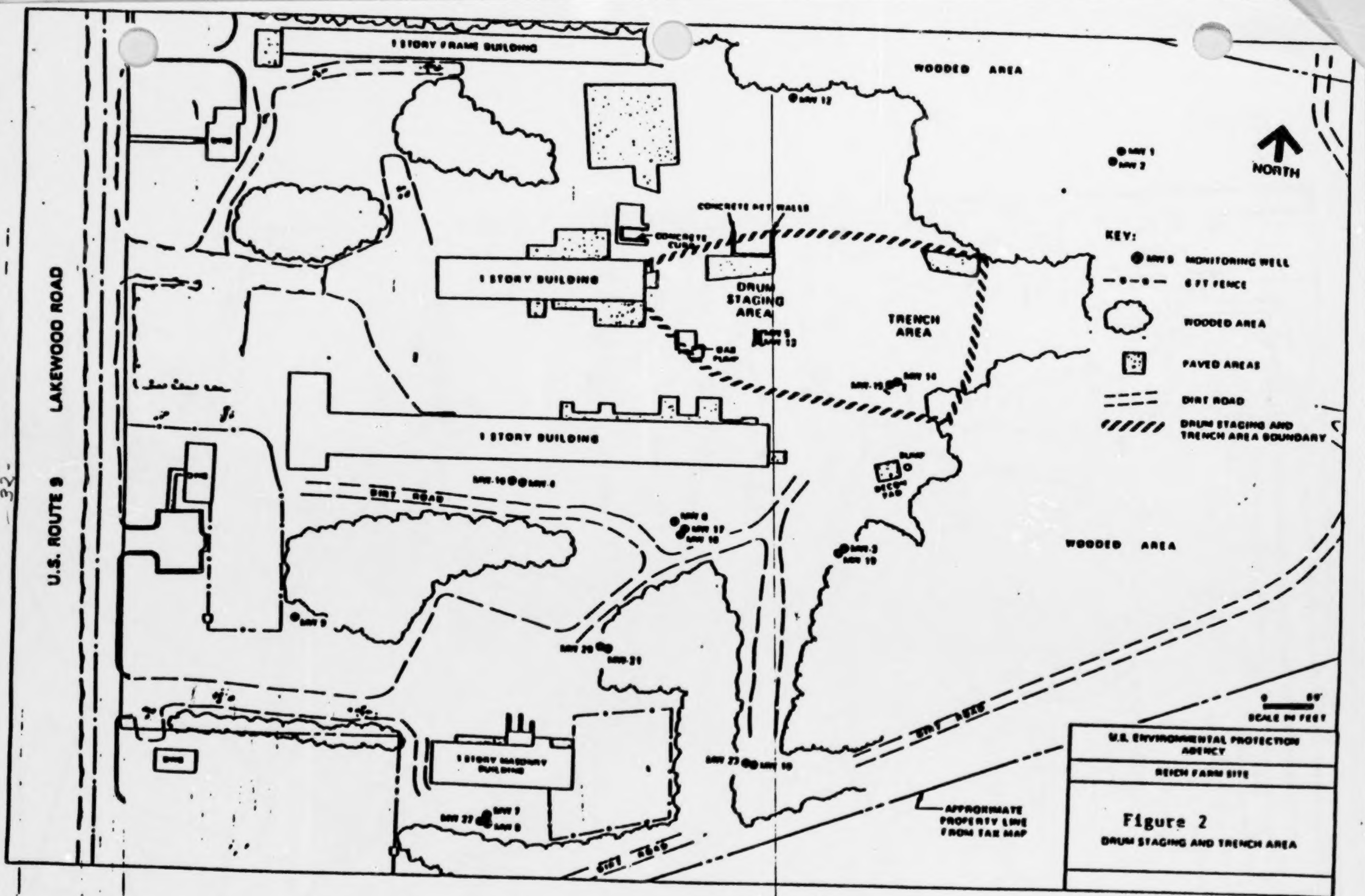
In compliance with the Endangered Species Act, a consultation with the U.S. Fish and Wildlife Service will be carried out to evaluate the potential for encountering federal endangered or threatened species in the vicinity of the Reich Farm site. It is expected that the selected remedy will not have any detrimental impact on these species because of their transient nature in this area.

The site is located less than one mile from a stream and its associated wetlands, and is adjacent to the floodplains of concern as designated by the Federal Emergency Management Agency. Because of the distance between the site and these resources, it is not expected that the selected remedial actions would adversely impact them. However, if the proposed future ground water sampling indentifies the presence of site generated contamination affecting these resources, a wetlands/floodplains assessment will then be conducted to ensure compliance with Executive Orders 11988 and 11990 before the remedial action is implemented.


NORTH
White Oak Bottom
MYERS RD
SILVERTON
ROAD
STEVENS RD
TODD
REICH FARM SITE
Pleasant Plains
Toms River
CLAYTON AVE
WHITTY
Tollgate
Borrow Pit
INTERCHANGE 83
2 LANE
FREEHOLD ROAD
0
½
1 MILE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REICH FARM SITE
FIGURE 1
SITE AREA MAP

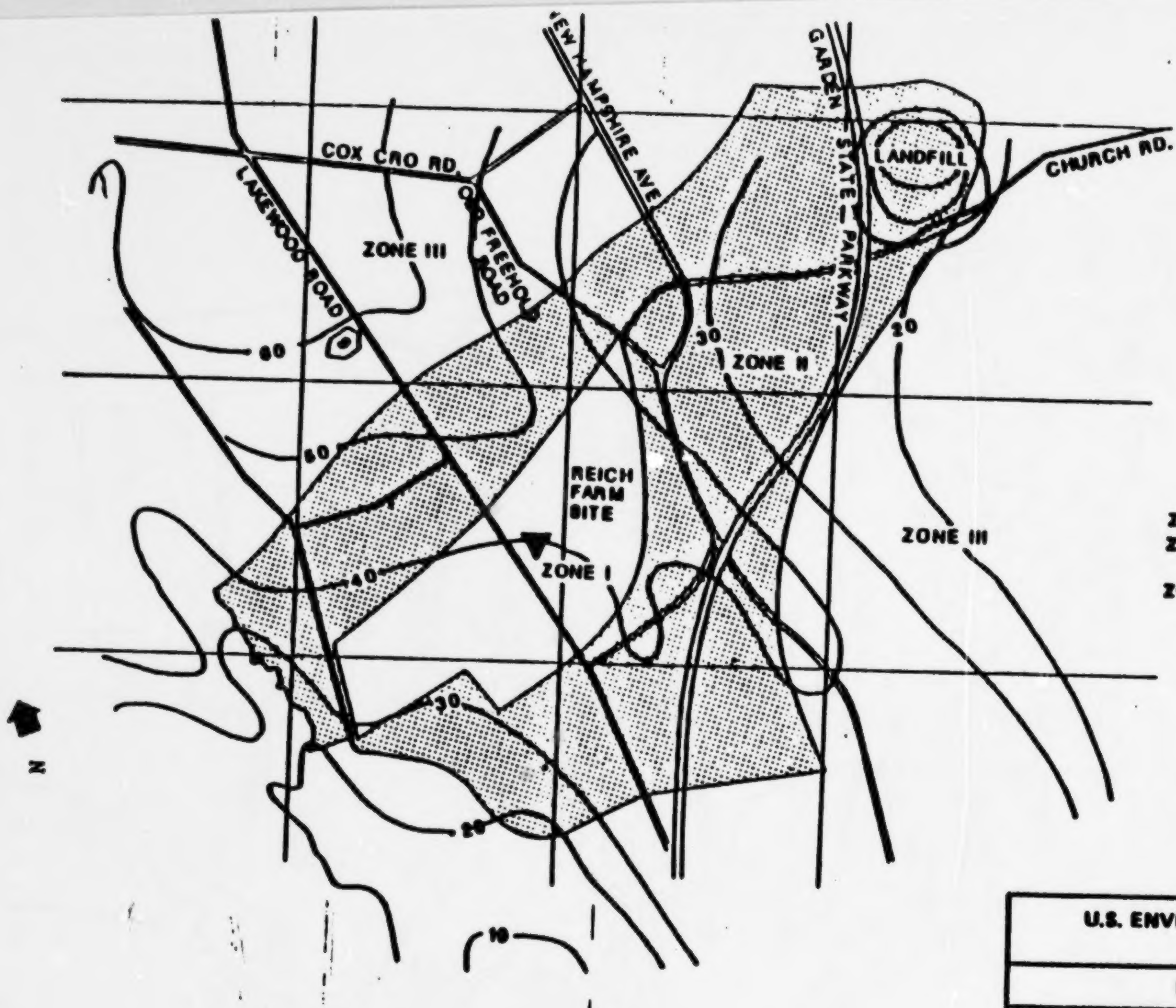
Reproduced from best available copy.


U.S. ROUTE 9
LAKEWOOD ROAD
1 STORY FRAME BUILDING
WOODED AREA
MW 12
MW 1
MW 2
NORTH
CONCRETE RET WALLS
CONCRETE CURB
1 STORY BUILDING
DRUM STAGING AREA
MW 5
MW 13
GAS PUMP
TRENCH AREA
MW 15
MW 14
1 STORY BUILDING
MW 16
MW 4
DIRT ROAD
DUMP
DECON PAD
MW 6
MW 17
MW 18
MW 3
MW 19
WOODED AREA
MW 9
MW 20
MW 21
MW 23
MW 10
1 STORY MASONRY BUILDING
MW 22
MW 7
MW 8
DIRT ROAD
DIRT ROAD
APPROXIMATE PROPERTY LINE FROM TAX MAP
KEY:
MW 5 MONITORING WELL
6 FT FENCE
WOODED AREA
PAVED AREAS
DIRT ROAD
DRUM STAGING AND TRENCH AREA BOUNDARY
0
50'
SCALE IN FEET

U.S. ENVIRONMENTAL PROTECTION AGENCY

REICH FARM SITE

Figure 2
DRUM STAGING AND TRENCH AREA


N
COX CRO RD.
LAKEWOOD ROAD
OLD FREEHOLD ROAD
NEW HAMPSHIRE AVE
GARDEN STATE PARKWAY
LANDFILL
CHURCH RD.
ZONE III
ZONE II
ZONE I
ZONE III
REICH FARM SITE
80
60
40
30
30
20
20
10

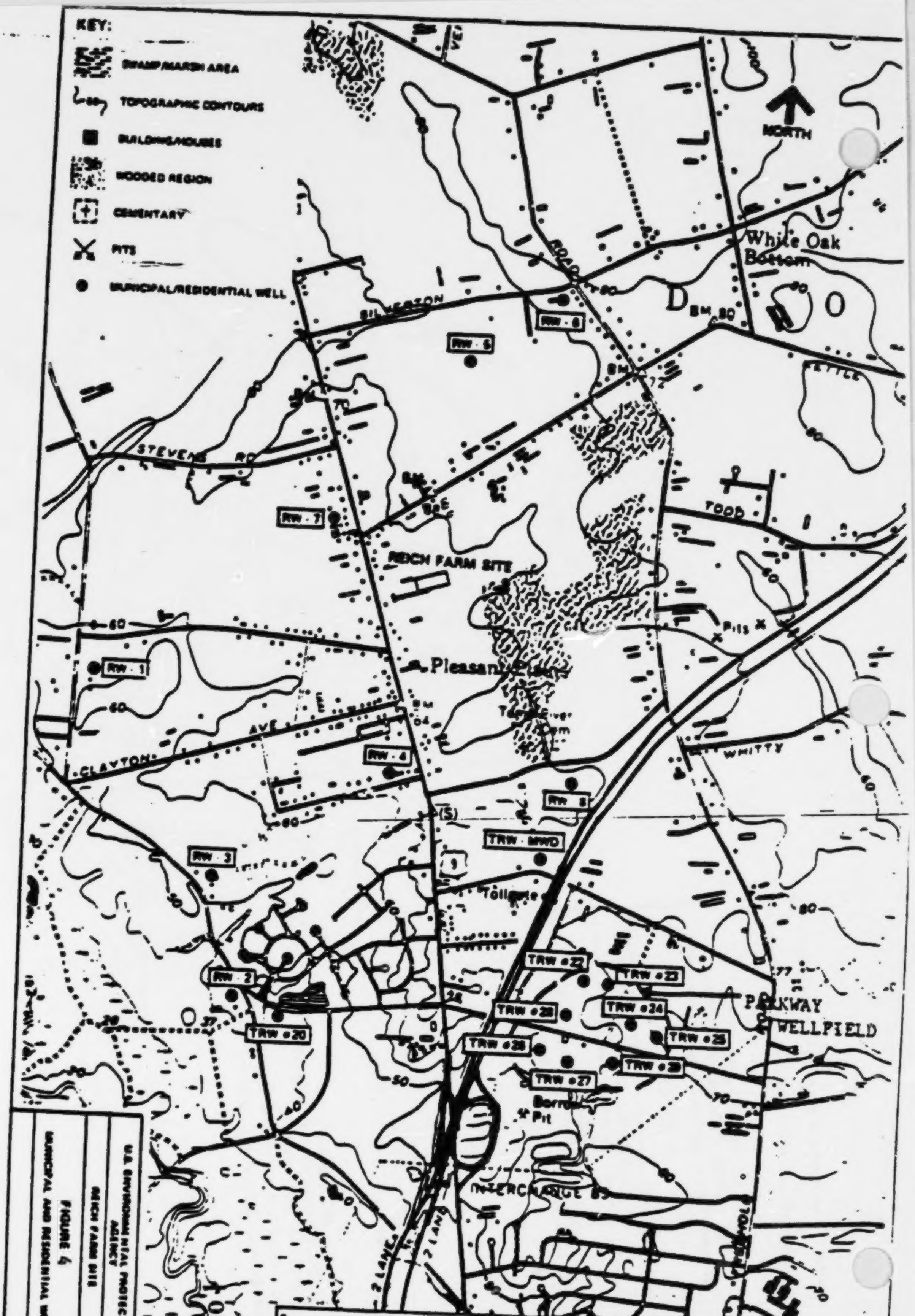
ZONE I: NO WELLS PERMITTED
ZONE II: WELLS SCREENED IN THE KIRKWOOD OR DEEPER
ZONE III: NO RESTRICTIONS
(TRW, 1978)

U.S. ENVIRONMENTAL PROTECTION AGENCY

REICH FARM SITE

FIGURE 3

GROUNDWATER CONTOURS AND ZONES OF RESTRICTED GROUNDWATER USE IN PLEASANT PLAINS, NJ, 1974.



KEY:
SWAMP/MARSH AREA
TOPOGRAPHIC CONTOURS
BUILDING/HOUSES
WOODED REGION
CEMENTARY
PITS
MUNICIPAL/RESIDENTIAL WELL
NORTH
White Oak Bottom
SILVERTON
ROAD
STEVENS RD
TODD
REICH FARM SITE
Pleasant Plains
Toms River Cem
CLAYTON AVE
WHITTY
Pits
RW-1
RW-2
RW-3
RW-4
RW-5
RW-6
RW-7
RW-8
TRW-MWD
Tollgate
TRW-20
TRW-22
TRW-23
TRW-24
TRW-25
TRW-26
TRW-27
TRW-28
TRW-29
PARKWAY WELLFIELD
Borrow Pit
INTERCHANGE 8
2 LANE
0
¼
½
1 MILE

U.S. ENVIRONMENTAL PROTECTION AGENCY

REICH FARM SITE

FIGURE 4

MUNICIPAL AND RESIDENTIAL WELLS

Reproduced from best available copy.

TABLE 1
(page 1 of 13)

MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

A. SURFACE SOILS (0 - 2 ft. depth)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines
Volatiles			
Acetone	3/5	.017	1 ppm for total volatile organics (not exceeded)
2-Butanone	4/5	.011	
Tetrachloroethene	4/5	.022	
1,1,1-Trichloroethane	1/5	.007	
1,2-Dichloroethene	1/5	.001	
Toluene	3/5	.099	
Ethylbenzene	3/5	.059	
Total Xylenes	3/5	.180	
Chlorobenzene	2/5	.100	
Semi-Volatiles			
Bis(2-ethylhexyl) phthalate	5/5	5.7	10 ppm for total semi-volatile organics (not exceeded)
Di-n-octyl phthalate	1/5	.570	
Di-n-butyl phthalate	4/5	.110	
Butylbenzyl phthalate	2/5	.420	
Fluoranthene	1/5	.180	
Pyrene	1/5	.110	

TABLE 1
(page 2 of 13)

A. SURFACE SOILS (Continued)

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines (ppm)
Aluminum	5/5	4262	NG
Barium	5/5	16	400
Beryllium	3/5	.01	1
Calcium	5/5	1850	NG
Chromium	5/5	6	100
Cobalt	5/5	2	NG
Copper	5/5	20	170
Iron	5/5	5062	NG
Lead	5/5	15	250-1000
Magnesium	5/5	241	NG
Manganese	5/5	31	NG
Sodium	2/5	526	NG
Vanadium	5/5	76	NG
Zinc	5/5	17	350

TABLE 1
(page 3 of 13)

B. SUBSURFACE SOILS (> 2 ft depth)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines
Volatiles			
Methylene Chloride	6/91	1.300	1 ppm for total volatile organics (exceeded)
Acetone	20/115	12.000	
2-Butanone	21/126	31.000	
1,1,1-Trichloroethane	8/158	.118	
Tetrachloroethane	12/158	13.907	
Toluene	17/144	53.000	
Chlorobenzene	7/158	36.120	
Ethylbenzene	16/158	9.300	
Styrene	20/158	170.000	
Total Xylenes	17/158	3.597	
2-Hexanone	5/158	.045	
Trichloroethene	5/158	.001	
Vinyl Acetate	1/158	.001	
Carbon Disulfide	2/158	.011	
Benzene	2/158	.002	
Chloroform	1/158	.001	
4-Methyl-2-Pentanone	4/158	.047	

TABLE 1
(page 4 of 13)

B. SUBSURFACE SOILS (Continued)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines
Semi-volatiles			
Phenol	4/158	6.700	10 ppm for total semi-volatile organics (exceeded)
Napthalene	1/158	13.179	
4-Chloro-3-Methylphenol	1/158	.075	
2-Methylnapthalene	1/158	5.002	
Acenaphthene	1/158	10.390	
Dibenzofuran	1/158	5.157	
N-Nitrodiphenyl amine	5/158	.083	
Fluorene	1/158	7.043	
Phenanthrene	1/158	24.843	
Anthracene	2/158	2.641	
Fluoranthene	3/158	13.365	
Pyrene	5/158	7.911	
Di-n-butylphthalate	41/140	5.400	
Butylbenzylphthalate	17/157	74.836	
Diethylphthalate	1/158	.017	
2-Chlorophenol	2/158	.340	
1,3-Dichlorobenzene	2/158	15.000	
1,4-Dichlorobenzene	2/157	64.000	
1,2-Dichlorobenzene	4/157	95.000	
Napthalene	1/158	13.179	
1,2,4-Trichlorobenzene	5/158	6.600	

TABLE 1
(page 5 of 13)

B. SUBSURFACE SOILS (Continued)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines
Semi-volatiles (con't)			
Bis(2-ethylhexyl) phthalate	49/137	742.064	
Di-n-octylphthalate	7/156	1.900	

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines (ppm)
Aluminum	104/104	4960	NG
Arsenic	0/104	ND	20
Barium	92/104	80	400
Beryllium	62/101	1	1
Cadmium	5/104	2.4	3
Calcium	82/87	28250	NG
Chromium	85/95	46	100
Cobalt	79/104	11	NG
Copper	68/99	62	170
Iron	103/104	14636	NG
Lead	26/99	61	250-1000
Magnesium	76/94	8757	NG
Manganese	86/105	46	NG
Mercury	10/103	.6	1

TABLE 1
(page 6 of 13)

B. SUBSURFACE SOILS (Continued)

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppm)	New Jersey soil cleanup guidelines (ppm)
Nickel	7/104	158	100
Potassium	50/94	4452	NG
Silver	0/104	ND	5
Sodium	62/104	9313	NG
Vanadium	79/89	43	NG
Zinc	67/86	44	350

TABLE 1
(page 7 of 13)

C. GROUND WATER (MONITORING WELLS)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppb)	ARARS	
			State* (ppb)	Federal** (ppb)
Volatiles				
Methylene Chloride	4/30	640	2	NG
Acetone	9/37	74000	NG	NG
Toluene	3/45	3	+	2000 \
1,1-Dichloroethene	3/45	1	2	7
1,1-Dichloroethane	6/45	8	+	NG
1,2-Dichloroethene	4/45	7	10	70 \
2-Butanone	3/45	320	NG	NG
Chloroform	5/45	1	5, +	NG
1,1,1-Trichloroethane	15/44	130	26	200
Trichloroethene	11/45	15	1, +	5
Tetrachloroethene	8/45	19	1, +	5 \
1,2-Dichloroethane	1/45	5	2, +	5
Carbon Tetrachloride	1/45	16	2, +	5
Chlorobenzene	1/45	1	4, +	60 \\
Ethylbenzene	1/45	1	+	700 \

TABLE 1
(page 8 of 13)

C. GROUND WATER (MONITORING WELLS) Continued

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum Concentration detected (ppb)	ARARs State* (ppb)	ARARs Federal** (ppb)
Semi-volatiles				
Phenol	1/45	4	3500 <	NG
Bis(2-ethylhexyl) phthalate	18/44	2200	NG	21000 C
n-Nitrosodiphenyl-amine	1/45	6	NG	NG
Di-n-octylphthalate	1/45	4	NG	NG

TABLE 1
(page 9 of 13)

C. GROUND WATER (MONITORING WELLS) Continued

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppb)	ARARs	
			State* (ppb)	Federal (ppb)
Aluminum	18/18	2620	NG	NG
Antimony	1/18	65	NG	NG
Barium	10/18	83	1000	4700 \
Cadmium	2/18	6	3.7	5 \
Calcium	18/18	16500	NG	NG
Chromium	6/16	615	50]	100 \
Copper	8/17	127	NG	1300 \
Iron	18/18	41300	NG	300 S
Lead	7/17	56	50	50 P
Magnesium	18/18	3780	NG	NG
Manganese	18/18	318	NG	50 S
Mercury	3/18	.6	2]	2 P
Nickel	9/18	97	13.4	NG
Potassium	18/18	671	NG	NG
Silver	1/18	20	50	50 P
Sodium	18/18	41800	NG	NG
Vanadium	4/18	12	NG	NG
Zinc	11/16	1800	NG	5000 S
Cyanide	0/6	18	200 <	NG

TABLE 1
(page 10 of 13)

D. GROUND WATER (OFF-SITE POTABLE WELLS)

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maxiumum concentration detected (ppb)	ARARs	
			State* (ppb)	Federal** (ppb)
Volatiles				
Methylene Chloride	0/11	ND	2	NG
Toluene	1/23	1	+	2000 \
Acetone	0/22	ND	NG	NG
Trichloroethene	4/23	2	1, +	5
2-Butanone	6/18	14	NG	NG
Carbon Tetrachloride	1/23	7	2, +	5
Tetrachloroethene	3/23	5	1, +	5 \
1,1,1-Trichloroethane	1/23	5	26	200
4-methyl-2-pentanone	1/23	2	NG	NG
Chloroform	1/23	3	5, +	NG
Benzene	1/23	1	1, +	5
Semi-volatiles				
Bis (2-ethylhexyl) phthalate	2/23	10	NG	21000 C
Pentachlorophenol	1/23	54	NG	220 \\
2,4-dichlorophenol	1/23	54	NG	NG
4-chloro-3-methylphenol	1/23	46	NG	NG
Di-n-butyl phthalate	1/23	6	NG	NG
Benzo(k)fluoranthene	1/23	40	NG	NG
Pyrene	1/23	120	NG	NG

TABLE 1
(page 11 of 13)

D. GROUND WATER (OFF-SITE POTABLE WELLS) Continued

ORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppb)	ARARs	
			State (ppb)	Federal (ppb)
Semi-volatiles				
Isophorone	1/23	58	NG	NG
N-nitrosodi-n-propylamine	1/23	120	NG	NG
Fluoranthene	1/23	58	NG	NG

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppb)	ARARs	
			State* (ppb)	Federal** (ppb)
Aluminum	14/17	783	NG	NG
Barium	10/17	80	1000	4700 \
Beryllium	1/17	2	NG	NG
Cadmium	1/17	273	3.7	5 \
Calcium	12/17	5070	NG	NG
Chromium	0/17	ND	50]	100 \
Cobalt	2/17	11	NG	NG
Copper	12/17	190	NG	1300 \
Iron	14/17	1648	NG	300 S
Lead	6/17	58	50	50 P
Magnesium	12/17	3250	NG	NG

TABLE 1
(page 12 of 13)

D. GROUND WATER (OFF-SITE POTABLE WELLS)

INORGANIC CONTAMINANTS	# of detects/ # of samples taken	Maximum concentration detected (ppb)	ARARS State (ppb)	ARARS Federal (ppb)
Manganese	12/17	55	NG	50 S
Mercury	6/17	.7	2 <	2 P
Nickel	2/17	86	13.4	NG
Potassium	12/17	3370	NG	NG
Selenium	1/17	1.3	10 <	10 P
Silver	0/17	ND	50	50 P
Sodium	17/17	18500	NG	NG
Tin	1/17	58	NG	NG
Vanadium	2/17	13	NG	NG
Zinc	11/17	1800	NG	5000 S

TABLE 1
(page 13 of 13)

DATA REPORTING QUALIFIERS

*	All standards are New Jersey Maximum Contaminant Levels (MCLs) for "A-280" Contaminants (NJAC 7:10-16) unless stated otherwise.
**	All standards are Safe Drinking Water Act MCLs unless stated otherwise.
+	The total concentration limit for all contaminants with this indicator is 50 ppb in ground water.
\	Proposed Safe Drinking Water Act MCL.
\\	Maximum Contaminant Level Goals (MCLGs). These are not ARARs.
<	NJAC 7:9-6 Ground Water Standards, New Jersey Water Pollution Control Act.
C	Clean Water Act Water Quality Criteria for Human Health Adjusted for Drinking Water.
]	New Jersey Pollution Discharge Elimination System (NJPDES)-Ground Water Protection.
P	Safe Drinking Water Act Primary Standards (for health considerations).
S	Safe Drinking Water Act Secondary Standards (these standards do not indicate a potential health risk; they relate to the aesthetic quality of drinking water (i.e., odor, taste, etc.).
NG	A value is NOT GIVEN for this compound.
ND	Sample was analyzed for this compound but it was NOT DETECTED in that sample.

TABLE 2
(page 1 of 2)

POTENTIAL RISKS ASSOCIATED WITH CONTAMINANT PATHWAYS

Contaminant Pathway	Plausible* Exposure Pathway	Compounds** of Concern	HI	Carcinogenic Risk Factor
Dermal contact with or ingestion of soil by trespassers	YES	none	---	----
Transport of contamination from soil to air	YES	none	---	----
Migration of contaminants from soil to surface water	NO	----	---	----
+ Ingestion of contaminated ground water on-site	YES	acetone	12	----
		BEHP	1.8x10-1	4.4x10-5
		TCE	---	2.4x10-6
		PCE	1.6x10-2	1.4x10-5

* If an exposure pathway was considered plausible, it was then evaluated in the Public Health Evaluation (PHE).

** An indicator compound was considered a compound of concern if it had a Hazardous Index (HI) > 1 or a Carcinogenic Risk Factor > 1x10-6

+ There is presently no risk from the ground water on-site because it is not used as a potable water source. This pathway was evaluated to determine a potential future risk from this ground water.

TABLE 2
(page 2 of 2)

	Contaminant Pathway	Plausible* Exposure Pathway	Compounds** of Concern	HI	Carcinogenic Risk Factor
++	Migration of contamination from soil to ground water	YES	ethylbenzene	1.8	----
			chlorobenzene	86	----

* If an exposure pathway was considered plausible, it was then evaluated in the Public Health Evaluation (PHE).

** An indicator compound was considered a compound of concern if it had a Hazardous Index (HI) > 1 or a carcinogenic risk factor > 1x10-6.

++ The risk posed by this contaminant pathway was evaluated by considering the indicator compounds to have reached their maximum concentrations in the ground water.

TABLE 3
(page 1 of 3)

RATIONALE FOR SELECTION OF REMEDIAL ALTERNATIVES

GROUND WATER OBJECTIVES

Compound/ Compound Type	Rationale	Accepted as Remedial Objective
Metals	Four metals were detected at levels which exceeded ARARs. Metal detections were scattered. There were a number of detections in upgradient wells. No evidence that metals were dumped at Reich Farm. Detections do not seem to be site related.	NO
1,2 Dichloroethene	Detected slightly above New Jersey MCL in only 1/45 monitoring well samples. Detection considered an anomaly.	NO
Carbon Tetrachloride	Same as above.	NO
Methylene Chloride	Detected in four samples slightly above New Jersey MCL. Not evaluated as an indicator compound in PHE. The small number of detections (4/30) and the fact that methylene chloride is a typical field and laboratory contaminant indicates that the methylene chloride detected is not likely present at the site. Further testing should be done to confirm.	NO (Further testing required)

TABLE 3
(page 2 of 3)

GROUND WATER OBJECTIVES (continued)

Compound/ Compound Type	Rationale	Accepted as Remedial Objective
Acetone	No ARARs. Detected in one sample above health protective level calculated in PHE. Concentration in that sample seems to be an anomaly because it was much higher than the next highest detection. Also, acetone is a typical laboratory contaminant. Further testing is required.	NO (Further testing required)
BEHP	Detected in two samples above health protective levels determined in PHE. High detections seem to be anomalies. BEHP is a typical field and laboratory contaminant. Further testing should be done.	NO (Further testing required)
TCE, TCA, PCE	Detected above respective New Jersey MCLs in a number of samples. PHE showed TCE and PCE to be above respective health based levels calculated in PHE. Consistent with types of compounds thought to have been dumped at the site. Detections indicate a ground water plume.	YES

SOIL OBJECTIVES

Compound/ Compound Type	Rationale	Accepted as Remedial Objective
Metals	Only one detection of nickel above New Jersey Soil Action Levels. No pattern of metal contamination. No indication that metals were dumped at Reich Farm.	NO

TABLE 3
(page 3 of 3)

SOIL OBJECTIVES (continued)

Compound/ Compound Type	Rationale	Accepted as Remedial Objective
Volatile Organics	Would cause a health risk if reached maximum concentrations in ground water. Detected above New Jersey Soil Cleanup Action Level of 1 ppm.	YES
Semi-volatile Organics	BEHP presently detected in ground water. If maximum concentration of BEHP was attained in the ground water through migration from the soil, health based levels calculated in the PHE would be exceeded. No other semi-volatile was evaluated in this manner. Above New Jersey soil Action Level of 10 ppm.	YES

TABLE 4
(page 1 of 2)

SCREENING OF REMEDIAL TECHNOLOGIES FOR GROUND WATER

Reich Farm Site

Technology	Advantages/ Disadvantages	Technology Retained
I. GROUND WATER CONTROL MEASURES		
Capping	Upper portion of soil is not significantly contaminated. Horizontal migration of contamination in ground water unaffected.	no
Subsurface Barriers	Difficult to install because the barrier must be keyed into an impermeable layer which is located at a depth of 2500 feet at the site.	no
Ground Water Pumping	Effective in manipulation and management of ground water to control a plume. Should be combined with a treatment technology.	yes
II. ON-SITE TREATMENT		
Physical Treatment		
Air Stripping	Most effective for treating volatile organic contaminants. May require air emission controls. Treatability studies have shown it to be effective for treating the ground water at the site.	yes
Steam Stripping	More costly than air stripping and the extra degree of effectiveness is not necessary for the conditions at the site.	no
Carbon Adsorption	Effective in removing volatile and semi-volatile organics in ground water. Contaminated carbón generated would require treatment or disposal.	yes

TABLE 4
(page 2 of 2)

Technology	Advantages/ Disadvantages	Technology Retained
Chemical Treatment		
UV Oxidation	Volatile organics at the site have been effectively treated by this method elsewhere. Pilot studies would be required.	yes
Chemical Oxidation/ Chemical Reduction	Not as effective as UV oxidation. May leave organics in effluent.	no
III. PLACEMENT TECHNOLOGIES		
POTW	There are currently no POTWs in the area of the Reich Farm site.	no
Reinjection of Ground Water	Must be combined with treatment technologies. Potential problems include clogging and plugging by chemical precipitation. Feasible for site based on site hydrology and amount of ground water requiring treatment.	yes

TABLE 5
(page 1 of 3)

SCREENING OF REMEDIAL TECHNOLOGIES FOR SOIL

Reich Farm Site

Technology	Advantages/ Disadvantages	Technology Retained
I. CONTAINMENT TECHNOLOGIES		
Subsurface Barriers	Isolation of soil will prevent contaminant transport to ground water. Grout curtain is the most effective type of barrier for the site.	yes
Single-Layer Cap	Susceptible to erosion. Typically used as a temporary cap.	no
Multi-Layer Cap	Prevents percolation of rain water through the contaminated soil. Most durable type of cap. Must be monitored to insure integrity is maintained. Should be combined with a subsurface barrier.	yes
II. TREATMENT TECHNOLOGIES		
Chemical Treatment		
Solvent Extraction/ Recovery	Not a proven technology. Additional units required to remove volatile organic contaminants from extraction solution.	no
Fixation	Generally used for soils contaminated with metals. Clays in the soil on-site may interfere with process.	no
Thermal Treatment		
Incineration	Will destroy all organics in the soil. Based on the amount of soil requiring treatment, there are several vendors available.	yes

TABLE 5
(page 2 of 3)

Technology	Advantages/ Disadvantages	Technology Retained
Enhanced Volatilization	Effective in removing all volatile and some semi-volatile organics from the soil. The remaining soil must be treated by a different method.	yes
Thermoplastic Solidification	Some of the volatile organics found at the site diffuse rapidly through the material which is created by this process.	no
In Situ Treatment		
In Situ Biodegradation	It is doubtful that anaerobic biodegradation would destroy the chlorinated hydrocarbons in the soil.	no
Soil Flushing	Clay lenses located throughout the area would make it difficult to remove all of the contamination and recapture all of the soil washing fluid.	no
In Situ Vacuum Extraction	Can remove volatile organics from the soil. A pilot scale test would be required and the semi-volatile contaminated soil would require treatment by a different method.	yes
In Situ Vitrification	Still in development stage. Problems which need to be corrected include electrode failure and the collection of off-gas streams.	no
III. PLACEMENT TECHNOLOGIES		
Landfills	Landfilling is discouraged by EPA. RCRA Landban will limit the types of waste which can be disposed in the future.	no
On-Site Placement	Must be used in conjunction with treatment. Treated soil would be non-hazardous and therefore can be used as backfill.	yes

TABLE 5
(page 3 of 3)

Technology	Advantages/ Disadvantages	Technology Retained
IV. TRANSPORTATION OF SOIL		
Trucks	Road access to site is available. Provides flexibility in the amount of soil which can be handled. Special facilities are not required.	yes
Train	Nearest rail spur is five miles from the site, therefore, trucks would still be required.	no
Barge	Not appropriate for small amount of soil. Distance to nearest available water body is prohibitive.	no

TABLE 6
(page 1 of 2)

COMPARISON OF PRESENT WORTH FOR REMEDIAL ALTERNATIVES

Ground Water Alternative	Alternative Description	Capital Cost ($)	O & M Costs ($/yr)	Present Worth Value ($)
GW-1	No Action	0	15,600	239,800
GW-2	Pump/Treat Using Air Stripping and Carbon Adsorption/ Reinject	905,000	395,400	3,958,200
GW-3	Pump/Treat Using Carbon Adsorption/ Reinject	824,800	429,600	4,142,000
GW-4	Pump/Treat Using UV-Oxidation/ Reinject	1,294,400	588,200	5,836,300

Soil Alternative	Alternative Description	Capital Cost ($)	O & M Costs ($/yr)	Present Worth Value ($)
S-1	No Action	230	21,525	331,100
S-2	Grout Curtain/ Cap	496,100	19,160	790,600
S-3	Excavation/ On-Site Incineration/ On-Site Placement	2,493,700	113,960	2,602,200
S-4	Excavation/ Off-Site Treatment and Disposal	3,416,200	0	3,416,200

TABLE 6
(page 2 of 2)

Soil Alternative	Alternative Description	Capital Cost ($)	O & M Costs ($/yr)	Present Worth Value ($)
S-5	Excavation/ Enhanced Volatilization/ On-Site Placement/ Off-Site Treatment and Disposal	1,916,000	24,150	1,939,200
S-6	In Situ Vacuum Extraction/ Excavation/ Off-Site Treatment and Disposal	2,118,000	35,400	2,183,800

EPA WORK ASSIGNMENT NUMBER: 129-2L49
EPA CONTRACT NUMBER: 68-01-7250

FINAL RESPONSIVENESS SUMMARY
FOR THE
REICH FARM SITE
DOVER TOWNSHIP,
OCEAN COUNTY, NEW JERSEY

SEPTEMBER 1988

NOTICE

The information in this document has been funded by the United States Environmental Protection Agency (U.S. EPA) under REM III Contract No. 68-01-7250 to Ebasco Services, Inc. (EBASCO).

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EBASCO SERVICES INCORPORATED

160 Chubb Avenue, Lyndhurst, NJ 07071 (201) 460-1900

EBASCO

September 26, 1988
RMOII-88-264

Ms. Lillian Johnson
Community Relations Coordinator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

SUBJECT: REM III Program - EPA Contract Number: 68-01-7250
Work Assignment Number: 129-2L49
Reich Farm Site
Final Responsiveness Summary

Dear Ms. Johnson:

EBASCO Services Incorporated (EBASCO) is pleased to submit this Final Responsiveness Summary for the Reich Farm Site. If you have any comments, please call me at (201) 460-6434 or Gerry Zanzalari at (201) 906-2400.

Very truly yours,

Dev R. Sachdev

Dev R. Sachdev
REM III Region II
Manager

cc: M. Shaheer Alvi
M.K. Yates
R.T. Fellman
M. Amdurer
J. McAdoo
B. Weinstein

ACKNOWLEDGEMENT OF RECEIPT

Please acknowledge receipt of this enclosure on the duplicate copy of this letter and return the signed duplicate of this letter to: Dr. Dev Sachdev, EBASCO Services Incorporated, 160 Chubb Avenue, Lyndhurst, New Jersey 07071.

Ms. Lillian Johnson

Date

REM III PROGRAM
REMEDIAL PLANNING ACTIVITIES AT SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE DISPOSAL SITES WITHIN EPA REGIONS I-IV

EPA WORK ASSIGNMENT NUMBER: 129-2L49
EPA CONTRACT NUMBER: 68-01-7250

FINAL RESPONSIVENESS SUMMARY FOR THE REICH FARM SUPERFUND SITE DOVER TOWNSHIP, OCEAN COUNTY, NEW JERSEY

SEPTEMBER 1988

Prepared By:

Gerry Zanzalari
Gerry Zanzalari
REM III Community
Relations Specialist
ICF Technology, Inc.

9/28/88
Date

Approved By:

Bruce Weinstein
Bruce Weinstein
REM III Site Manager
Ebasco Services, Inc.

9/29/88
Date

Dev R. Sachdev
Dev R. Sachdev
REM III Region II
Manager
Ebasco Services, Inc.

9/29/88
Date

REICH FARM SITE
PLEASANT PLAINS, DOVER TOWNSHIP
OCEAN COUNTY, NEW JERSEY
FINAL RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) held a public comment period from August 17, 1988 through September 19, 1988 for interested parties to comment on EPA's final Remedial Investigation and Feasibility Study (RI/FS) and Proposed Remedial Action Plan (PRAP) for the Reich Farm Superfund site.

EPA held a public meeting on August 30, 1988 at the Dover Township Municipal Building in Toms River, New Jersey to describe the remedial alternatives and present EPA's preferred remedial alternatives for the Reich Farm site.

A responsiveness summary is required for the purpose of providing EPA and the public with a summary of citizens' comments and concerns about the site as raised during the public comment period, and EPA's responses to those concerns. All comments summarized in this document will be factored into EPA's final decision for selection of the remedial alternatives for cleanup of the Reich Farm site.

I. RESPONSIVENESS SUMMARY OVERVIEW. This section briefly describes the background of the Reich Farm site and outlines the proposed remedial alternatives.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS. This section provides a brief history of community interest and concerns regarding the Reich Farm site.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS. This section summarizes comments submitted to EPA at the public meeting and during the public comment period and provides EPA's responses to these comments.

IV. REMAINING CONCERNS. This section discusses community concerns that EPA should be aware of as they prepare to undertake the remedial designs and remedial actions at the Reich Farm site.

I. RESPONSIVENESS SUMMARY OVERVIEW

The Reich Farm site is located in the Pleasant Plains section of Dover Township, Ocean County, New Jersey. The site consists of an open, relatively flat, sandy area encompassing approximately one acre. The site is abutted by commercial establishments on the west and wooded areas on all other sides.

The following information was obtained from the TRW final report entitled "Analysis of a Land Disposal Damage Incident Involving Hazardous Waste Materials," Dover Township, New Jersey, May 1976. Mr. and Mrs. Samuel Reich, the owners of the property, discovered approximately 4,500 drums containing wastes on a portion of their land that they had rented to a Mr. Nicholas Fernicola. These drums bore labels indicating that they belonged to Union Carbide Corporation. In addition, trenches, into which wastes were believed to have been dumped, were also discovered on the property. From 1972 to 1974, Union Carbide Corporation removed approximately 5,150 drums and 1,100 cubic yards of visibly contaminated soil and trenched wastes from the Reich Farm site.

In August 1974, 148 private wells near the Reich Farm site were ordered closed by the Dover Township Board of Health following an analysis performed on a number of these wells which revealed the presence or organic contaminants in the water. Based on recommendations from the New Jersey Department of Environmental Protection (NJDEP), a zoning ordinance restricting the use of groundwater in the area of Reich Farm was established. Reich Farm was one of 418 sites placed on EPA's proposed National Priorities List (NPL) of hazardous waste sites issued in December 1982.

At EPA's direction, a preliminary RI was conducted by NUS Corporation in 1986 and a supplemental RI was conducted by Ebasco Services Incorporated in 1987. The results of these investigations indicate the following:

- The surface soils on-site (those soils at depths of five feet or less) show no significant contamination.
- "Hot spots" are present in the subsurface soils (those soils at depths of greater than five feet). These "hot spots" are contaminated with both volatile and semi-volatile organics.
- Groundwater underlying and downgradient of the site is also contaminated with low levels of organics, predominantly trichloroethene (TCE), tetrachloroethene (PCE), and 1,1,1-trichloroethane (TCA).

SUMMARY OF REMEDIAL ALTERNATIVES

The Superfund law requires each site remedy that is selected to be protective of human health and the environment, cost-effective, and in accordance with statutory requirements. Permanent solutions to contamination problems are to be achieved wherever possible.

In the course of the RI/FS process, it was determined that remedial actions at the Reich Farm site should encompass both the groundwater and the soil. In order to maintain consistency with the FS, alternatives addressing cleanup of the groundwater will be presented separately from those addressing soil remediation.

GROUNDWATER ALTERNATIVES

The objectives which have been preliminarily identified for remediation of the groundwater underlying the Reich Farm site are:

(1) Reduction of TCE to a concentration of 1 part per billion (ppb) in the groundwater;

(2) Reduction of PCE to a concentration of 1 ppb in the groundwater, and

(3) Reduction of TCA to a concentration of 26 ppb in the groundwater.

These concentrations are New Jersey Maximum Contaminant Levels (MCLs), and are considered relevant and appropriate requirements for cleanup of groundwater in the State of New Jersey.

Alternative GW-1: NO ACTION

Construction Cost:	$0
Annual O&M Costs (Operation and Maintenance):	$15,330
Time to Implement:	1 Month

This alternative includes the use of existing monitoring wells (installed during the remedial investigations) to conduct long-term monitoring of the contaminant concentrations in the Cohansey Aquifer underlying the site. Under this alternative, use of groundwater in the area will continue to be restricted.

Alternative GW-2: PUMPING/AIR STRIPPING/CARBON ADSORPTION/REINJECTION

Construction Cost:	$905,000
Annual O&M Costs:	$390,000
Time to Implement:	11 Years

Under Alternative GW-2, extraction wells will be installed to withdraw contaminated groundwater for treatment. The placement of these extraction wells will be determined after additional groundwater sampling. This sampling will be conducted as part of the remedial design and will help delineate the full extent of the contaminant plume originating from the Reich Farm site. The extraction wells will then be placed so that they will effectively and efficiently capture the plume. The extracted groundwater will be treated by air stripping followed by carbon adsorption. Treatability studies performed during the RI have shown this treatment scheme to be capable of removing the contaminants of concern from the groundwater. The emissions from the air stripper will be monitored and, if necessary, the off-gases will be treated by a vapor phase granular activated carbon (GAC) filter before they are released to the atmosphere to ensure that the maximum allowable air emissions are not exceeded. The treated groundwater will be discharged to injection wells installed upgradient of the site. In order to evaluate the performance of this remedial action, sampling and testing of the groundwater before and after treatment will be required. This type of performance monitoring will also be necessary for Alternatives GW-3 and GW-4.

Alternative GW-3: PUMPING/CARBON ADSORPTION/REINJECTION

Construction Cost:	$825,000
Annual O&M Costs:	$424,000
Time to Implement:	11 Years

This alternative uses the same pumping system as Alternative GW-2, however, the groundwater will be treated via two GAC adsorbers placed in series. The reinjection scheme will also be the same as for Alternative GW-2.

Alternative GW-4: PUMPING/H_2O_2-UV OXIDATION/CARBON ADSORPTION/REINJECTION

Construction Cost:	$1,294,000
Annual O&M Costs:	$575,000
Time to Implement:	12 Years

This alternative is similar to Alternative GW-2 except that the contaminated groundwater will be treated by chemical oxidation instead of air stripping. This chemical oxidation employs a combination of hydrogen peroxide (H_2O_2) and ultraviolet (UV) light to chemically oxidize the volatile organic contaminants (VOCs) in the groundwater. The pumping and reinjection systems are the same as for Alternative GW-2.

SOIL ALTERNATIVES

The following soil alternatives, with the exception of No Action, involve the remediation of "hot spots" in the subsurface soils. An area was designated as a "hot spot" if the concentration of contaminants in the soil exceeded the New Jersey Soil Cleanup Guidelines of 1 ppm (part per million) of total volatile organics or 10 ppm of total semi-volatile organics. Although these guidelines are not considered legally applicable or relevant and appropriate requirements (ARARs), cleanup to these levels will ensure that the contaminants in the soil do not migrate into the groundwater. For those alternatives which involve treatment, the amount of soil requiring remediation is an estimated figure. Testing will be performed during the remedial action to ensure that all soil with contaminant concentrations above the cleanup guidelines is treated.

Alternative S-1: NO ACTION

Construction Cost:	$0
Annual O&M Costs:	$20,000
Time to Implement:	1 Month

The No Action soil cleanup alternative consists of a long-term monitoring and control program. Warning signs will be posted at the site to alert people to the subsurface soil contamination. In addition, measures will be taken to restrict public access to the site. To assess the migration of contaminants into the groundwater, a long-term monitoring program, using existing monitoring wells, will be implemented.

Alternative S-2: CAPPING/GROUT CURTAIN

Construction Cost:	$500,000
Annual O&M Costs:	$25,000
Time to Implement:	12 Months

In this alternative, a multi-layer cap will be placed over each "hot spot". A grout curtain will then be injected around the perimeter of each area. The grout curtain will extend down to the water table located 30 feet below the surface. The cap will consist of a synthetic liner, a sand layer, a layer of crushed stone, a layer of coarse aggregate bituminous concrete, and a layer of fine aggregate bituminous concrete. The grout curtain is made of cement mixed with bentonite, soil and water. A long-term groundwater monitoring program, as described in the No Action alternative, will be included with this alternative.

Alternative S-3: EXCAVATION/ON-SITE INCINERATION AND PLACEMENT

Construction Cost:	$2,500,000
Annual O&M Costs:	$92,000
Time to Implement:	12 Months

This alternative will involve excavation of approximately 2,620 cubic yards of soil, 2,010 cubic yards of which will be subsurface soil requiring treatment. The remaining 610 cubic yards is surface soil which is not significantly contaminated. This soil will be stored and eventually used to backfill the excavated areas. The contaminated soil will be treated in a mobile incinerator brought to the site. The incineration system will contain a scrubber to collect any off-gases, produced by particulate and acid gas removal, prior to release to the atmosphere. The treated soil will be tested to ensure that the cleanup level goals have been achieved and will then be used as backfill in the excavated areas.

Alternative S-4: EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

Construction Cost:	$3,550,000
Annual O&M Costs:	$0
Time to Implement:	6 Months

The extent of soil excavation for this alternative will be the same as described in Alternative S-3. The 2,010 cubic yards of contaminated soil will be transported off-site to a licensed contracting company for treatment and disposal. Clean fill and the overburden soil will be used to backfill the excavated areas.

Alternative S-5: EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE PLACEMENT/OFF-SITE TREATMENT AND DISPOSAL

Construction Cost:	$1,916,000
Annual O&M Costs:	$0
Time to Implement:	9 Months

In this alternative, approximately 1,480 cubic yards of soil will be initially excavated, 1,120 cubic yards of which are subsurface soils contaminated with volatile organics. The remaining 360 cubic yards are surface soils which will be temporarily stored and later used as backfill in the excavated areas. The volatile organic contaminated soil will be staged on site and treated via an enhanced volatilization unit. In this facility, hot air will be injected into a thermal processor (rotary dryer) containing the soil to be treated. The volatile organics in the soil will volatilize into the air stream and combust in an afterburner, where they will be destroyed. The off-gas from the afterburner will then be treated in a scrubber for particulate and acid gas removal. In certain cases, the afterburner can be replaced with a carbon adsorber to remove the volatiles from the air stream. In this case, no scrubber would be needed. After testing to ensure that the level of total volatile organics is below 1 ppm, the soil will be used as backfill in the excavated area.

The second stage of this alternative involves excavating approximately 1,140 cubic yards of soil, 890 cubic yards of which are contaminated with semi-volatile organics. Most semi-volatile organics are not adequately removed by enhanced volatilization, therefore, this soil will be taken off-site for treatment (via incineration) and disposal. The area of this excavation will be backfilled with clean fill in addition to the 250 cubic yards of surface soil which were excavated but did not require treatment.

Alternative S-6: IN SITU VACUUM EXTRACTION/EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

Construction Cost:	$2,118,000
Annual O&M Costs:	$16,500
Time to Implement:	24 Months

In situ vacuum extraction involves installing wells at a depth of approximately 20 feet in the area of those "hot spots" which are contaminated with volatile organics. The wells are then connected via a pipe system and attached to a vacuum pump. The vacuum pulls air through the contaminated soils. This air, containing the stripped volatile organics, is then fed to a unit to remove the volatiles. Excavation is not required for this stage of this alternative.

The second stage of this alternative will involve the treatment of 1,120 cubic yards of soil. The treatment method is the same as for the second stage of Alternative S-5 because vacuum extraction is not an adequate technology for the removal of semi-volatile organics from soil. The difference in the volume of soil to be treated as compared to Alternative S-5 results from the fact that enhanced volatilization is capable of removing some semi-volatile organics present in the soil which cannot be removed by in situ vacuum extraction.

EVALUATION OF ALTERNATIVES

The preferred alternatives for remediation of the contaminated groundwater and soil at the Reich Farm site are Alternative GW-2, Pumping/Air Stripping/Carbon Adsorption/Reinjection, and Alternative S-5, Excavation/Enhanced Volatilization/On-Site Placement/Off-Site Treatment and Disposal, respectively. Based on current information, these alternatives provide the best balance among the nine criteria that EPA uses as a means of evaluation.

THE PREFERRED ALTERNATIVES

The preferred alternatives, GW-2, Pumping/Air Stripping/Carbon Adsorption/Reinjection, for groundwater remediation, and S-5, Excavation/Enhanced Volatilization/On-Site Placement/Off-Site Treatment and Disposal, for soil remediation, would use proven treatment techniques. All volatile and semi-volatile organic contaminants in the soil would be treated to acceptable levels. The contaminants of concern in the groundwater would be reduced below their respective ARARs and the possible migration of these contaminants into drinking-water supplies would be eliminated. Equipment and labor necessary to construct these alternatives is currently available.

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II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Reich Farm site initially became an issue for public concern in 1974 when local residents noticed an unpleasant odor and taste in their drinking water. Subsequent sampling by EPA and Dover Township revealed the presence of organic contaminants in the water. In July and August 1974, the Dover Township Board of Health ordered the closing of 148 domestic wells which were thought to have been contaminated by wastes from the Reich Farm site. Additional complaints from local residents regarding similar problems with domestic well-water resulted in sampling and further detection of organic contamination and the closure of an additional 13 wells. All residents whose wells were closed were subsequently connected to a municipal water supply system.

Major issues and concerns expressed by the community regarding the Reich Farm site are listed below:

- Migration of Contamination through Groundwater. In the past, public concern has focused on the potential for contamination to migrate off the site itself through subsurface groundwater and reach uncontaminated downgradient wells owned by the Toms River Water Company, the municipal supply in the area.
- Economic Concerns. Local officials have, in the past, expressed concern over the potential for the area to acquire a negative image due to the problem of contaminated groundwater and subsequently become less desirable to prospective residents and businesses.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.

Comments raised during the public comment period for the Reich Farm site are summarized below. The public comment period was held from August 17, 1988 through September 19, 1988 to receive comments from the public on EPA's draft Remedial Investigation and Feasibility Study (RI/FS) and Proposed Remedial Action Plan (PRAP) for the Reich Farm Superfund site. The public comment period was extended until September 22, 1988 for two Potentially Responsible Parties (PRPs), Union Carbide Corporation and the Reichs. Comments received during the public comment period are summarized below and are organized into the following categories:

A. EFFECTIVENESS OF ALTERNATIVES

B. CONTAMINANTS

C. TECHNICAL CONCERNS

B. CONTAMINANTS

1. **Comment:** A resident asked if EPA is testing the groundwater at the Reich Farm site for all compounds listed in State of New Jersey A-280 legislation.

   EPA Response: Although State of New Jersey A-280 legislation; entitled the Interim Safe Drinking Water Testing Schedule establishes a schedule for testing public water supplies and lists priority pollutants, imposes more stringent guidelines on drinking water quality than federal guidelines, it also lists fewer priority pollutants. EPA is testing groundwater at the Reich farm site for more contaminants than are listed in the A-280 legislation. In any case, EPA will comply with the most stringent guidelines that are established.

2. **Comment:** A resident expressed concern that contaminants from the Reich Farm site could potentially affect downgradient municipal drinking-water wells owned by the Toms River Water Company.

   EPA Response: Based on EPA's studies of groundwater between the Reich Farm site and the Toms River Water Company wells, there is no indication that those wells have been affected by contaminants from the site. However, EPA plans to install additional groundwater monitoring wells to ensure that the outermost extent of the contaminant plume has been defined. These proposed wells are part of the design phase of the Reich Farm project and will also aid the agency in determining the effectiveness of the implemented remedial alternative.

3. **Comment:** A local official expressed concern that EPA has not fully identified the original source and full extent of off-site contamination attributable to the Reich Farm site.

   EPA Response: It is extremely difficult to determine exactly what occurred regarding initial off-site migration of contaminants that may have resulted when the barrels were first placed in the ground at the Reich Farm site. Since the contaminants were dumped illegally, there are no record of those events, therefore, circumstances surrounding those activities cannot be traced with one hundred percent accuracy. EPA's studies attempt to reconstruct a comprehensive picture of what occurred, however, we often encounter gaps in the information compiled. When EPA reaches the point where the agency feels confident that our studies accurately and adequately depict the site history, we then proceed with studies to identify the nature and extent of contamination and develop and evaluate methods to address the problem.

C. TECHNICAL CONCERNS

1. **Comment:** Several residents expressed concern regarding the potential for hazardous emissions coming from the proposed air stripper to be constructed on the Reich Farm site.

EPA Response: EPA must adhere to established state and federal emission standards. In the case of the Reich Farm site, we are dealing with relatively low levels of groundwater contamination, therefore, minimal emissions are expected from this particular air stripper. EPA also plans to continually monitor emissions from the air stripper to ensure compliance with established standards. If testing indicates state or federal emission standards will be exceeded, the air stripper will have a carbon filtration system installed near the top of the unit.

2. **Comment:** A resident asked if the air stripper would operate around the clock and cause unnecessary noise in a residential area.

EPA Response: Once the air stripper is installed, EPA plans to operate the unit on a twenty-four hour per day, seven day per week schedule for the duration of remedial activities. The agency has constructed similar units in other residential areas. The unit could be designed to operate at minimal noise levels and should not result in noise-related inconveniences to area residents.

D. HEALTH AND SAFETY

1. **Comment:** A resident expressed concern over potential health effects that may be posed by past contact with contaminated soil and/or groundwater from the Reich Farm site and suggested that EPA locate people who may have been exposed to site-related contaminants and conduct a health study to determine if any negative effects have, in fact, occurred.

ATSDR Response: ATSDR is concerned about public health and possible exposure to hazardous substances. However, it would be difficult to locate all the individuals who may have been exposed to contaminants from the Reich Farm site in the past. The agency is willing to discuss the feasibility of conducting such a study.

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E. RESPONSIBILITY OF POTENTIALLY RESPONSIBLE PARTIES (PRPs)

1. **Comment:** Several residents and a local official asked if a PRP had been identified and if that PRP would assume financial responsibility for site remediation and any health-related studies which may be conducted.

   EPA Response: A PRP has been identified by EPA and the agency is conducting discussions with them regarding site-related studies and costs. Regardless of the outcome of these negotiations, EPA, through Superfund, will proceed with cleanup of the Reich Farm site, and, if appropriate, pursue the PRP through legal channels.

F. TIME FRAME FOR REMEDIATION

1. **Comment:** Several residents expressed concern that the time frame required to remediate the Reich Farm site would be excessive considering the relative small size of the site.

   EPA Response: Within the next month, EPA, along with the State of New Jersey, will make a final decision regarding the best method to remediate the Reich Farm site. Following that decision, a contractor will be hired to design the proposed remedy. After completion of plans and specifications, a clean-up contractor will be chosen through a competitive bidding process. Remedial action at the site could be underway within one year.

OTHER CONCERNS

1. **Comment:** A resident asked if EPA would support local zoning legislation prohibiting any new construction on contaminated sites.

   EPA Response: EPA will support proposals of this nature.

IV. REMAINING CONCERNS

Concerns raised by the community regarding remedial action and design activities at the Reich Farm site will continue to be important community issues throughout the remedial design phase.

Since there are very active community environmental groups in the vicinity of the Reich Farm site, there is a moderate potential for the level of interest in the site to show significant increase once remedial design activities begin. Area residents should be kept fully informed of the status of remedial activities throughout this phase in order to dispel public concern.

65 Sunset Ave.
Toms River, NJ 08755

September 16, 1988

Ms. Romona Pezzella
Remedial Project Manager
USEPA
Room 759
26 Federal Plaza
New York, NY 10278

Dear Ms. Pezzella:

On August 30, 1988, I testified at the Reich Farms Public Hearing. Please consider this letter as a follow-up to that testimony.

The Pleasant Plains section of Toms River is a relatively quiet neighborhood consisting of predominantly private residences. Two concerns that should be addressed by EPA in their proposed remedial action plan are noise and air pollution.

The fan associated with the air stripping should be designed or acoustically housed so there is no noise impact on the community, especially during summer evening periods. A noise impact study should be completed to determine background noise data to assist in the proper engineering design of the fan.

Air pollution concerns are based upon the final air emissions from the control devices and the quantitative and qualitative characteristics of these emissions. Even though final air emissions are at the ppm or ppb level, a diffusion model based upon prevailing wind directions should be developed, since even minute air emissions over long periods of time can have adverse health impacts. If modelling indicates that final air discharges could disperse with adverse effects on neighboring homes, then EPA should consider more sophisticated air pollution controls.

It would be appreciated if you would address these concerns by responding to me in writing at the address indicated above.

Very truly yours,

Edward J. Capasso

Edward J. Capasso

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

September 29, 1988

Edward J. Capasso
65 Sunset Avenue
Toms River, NJ 08755

Dear Mr. Capasso:

This is in response to your letter, dated September 16, 1988, which you submitted as a follow-up to your appearance at the Reich Farm public meeting on August 30, 1988.

The Environmental Protection Agency (EPA) received a number of comments during the public meeting for the Reich Farm site and during the comment period which extended from August 17 to September 19, 1988. After review of all submitted comments, EPA intends to proceed with the final remedial solution for the site which is protective of human health and the environment, cost effective, and attains federal and state requirements that are applicable or relevant and appropriate.

Your letter expressed certain concerns over the noise which may result from the air stripper used in the ground water treatment system and the air emissions from this unit. In regard to the noise from the air stripper, similar units have been constructed by the EPA in residential areas. The unit will be designed to operate at minimal noise levels and should not disturb nearby residents.

When operating an air stripper, EPA must adhere to established state and federal emission standards. In the case of Reich Farm, there are very low levles of contamination in the ground water; therefore, minimal emissions are expected to be generated by this unit. The emissions from the air stripper will be constantly monitored to ensure compliance with established standards. If necessary, a vapor phase carbon filter will be installed at the top of the air stripper to eliminate the emissions.

I hope that your concerns have been adequately addressed. Your interest in the environment at the Reich Farm site is greatly appreciated.

Sincerely yours,

Romona Pezzella

Romona Pezzella, Project Manager
Southern New Jersey Remedial Action Section

Mr. Nicolas Fernicola of Toms River, New Jersey to provide drummed chemical waste disposal services for Union Carbide's Bound Brook, New Jersey plant. Mr. Fernicola was to remove these wastes during the period beginning in March of 1971 and ending on December 31, 1971, to one of several approved sites for disposal. However, contrary to his agreement with Union Carbide, Mr. Fernicola apparently moved some 4,000 Union Carbide drums onto Reich Farm during 1971. During February and March of 1972, after considerable discussion with the Reichs and Fernicola and with no admission of liability, Union Carbide removed the visible drums from the Site. In 1974, following the discovery of additional buried drums at the Site, Union Carbide performed an additional remedial activity, again without admission of liability, by excavating and removing some 11,000 cubic yards of soil along with removal of more than 50 additional drums. The Site first appeared on the National Priorities List (NPL) in 1982 and is now subject to proposed remediation.

While the above information is not subject to significant dispute, there are a number of issues pertaining to the 17 year history of this Site and which are not discussed in the RIFS which should be referenced here in order to give a more complete and accurate picture of the Reich Farm situation. For ease of reference in subsequent communications, I will number the points in the following paragraphs.

1. Hazard Ranking Score.

Reich Farm appeared on the initial proposed NPL on December 30, 1982, and the final NPL on September 8, 1983, due to a hazard ranking score of 53.48. A review of the score sheets by which Reich Farm was categorized, indicates that in developing the score, no account was given to extensive remedial activities performed by Union Carbide in 1972 and 1974. The preambles to the December 30, 1982 and September 8, 1983 Federal Register notices indicate that HRS scoring should not be based on current conditions at the scored site, so as not to discourage public agencies from taking early responses lest such actions lower the Hazard Ranking Score for a site and thus render a site ineligible for inclusion on the NPL. Needless to say, that rationale is not consistent with the facts in this case and makes very little sense with respect to Reich Farm, as full remediation was performed by a private party with full approval and agreement by the State of New Jersey more than 10 years before even a proposed NPL was published. While the Hazard Ranking Score may not bear on the specific findings in the RIFS, it is worth noting that if Reich Farm had been properly scored, it would never have appeared on the NPL in the first place.

2. Settlement of New Jersey Legal Action

In 1977, Union Carbide executed a Consent Order of Settlement and Dismissal of a lawsuit brought by the New Jersey Department of Environmental Protection (DEP) to require Union Carbide to abate alleged conditions at Reich Farm. In settlement, Union Carbide agreed to reimburse the State $60,000 for future costs incurred for the purposes of "investigation, sampling and, if New Jersey deems necessary, purifying or otherwise treating the groundwater in, or in the vicinity of, Dover Township, Ocean County, New Jersey, or taking such other related actions deemed by New Jersey to be necessary for the protection of the groundwater in said vicinity, including but not limited to the drilling of wells, the pumping of groundwater, the tracing of the movement of groundwater or of substances in groundwater, and the filtering or treating of groundwater in any manner, in said vicinity." We do not know the results of New Jersey's sampling which may have been done at the Site, nor do we know the extent of any further groundwater remediation which the State may have undertaken at the Site. This information may be relevant to the causes of some of the findings in the RIFS. In addition, there could even be some question as to the effects of any of the activities which may have been performed by the State at the Site. We know that the State was fully informed and involved in the Union Carbide remedial activities in the 1970's, and yet the RIFS background sections appear to ascribe virtually all responsibility to Union Carbide. I have enclosed a copy of the settlement document.

3. Additional Potentially Responsible Parties.

We have been advised that the RIFS and PRAP were forwarded to Union Carbide and the property owners (Mr. and Mrs. Reich). We are unaware as to whether the hauler, Mr. Fernicola, has been named a PRP. We also note that there are a construction company and excavating company performing activities at the Site, and we believe there may be other industrial establishments nearby. Clearly a more complete investigation should be performed by Region II for the purpose of ascertaining whether these other entities may have some responsibility at the Site. For example, we believe that chlorinated solvents, xylenes and toluenes, which apparently are of concern at the Site, could well have come from on-going activities there. It could well be appropriate for such other entities to review the RIFS and PRAP as possible PRPs. A review of disposal practices by such entities by Region II seems obviously to be in order for purposes of determining whether all PRPs have been named.

4. Nicolas Fernicola's Utilization of the Site.

Apparently, Union Carbide has been named a PRP at the Site due to CERCLA Section 107(a)(3), which ascribes liability to "any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances owned or possessed by such person, by any other party or entity, at any facility...". As stated above, we did not arrange with Mr. Fernicola to dispose of materials at Reich Farm, but rather at an approved site. In fact, one of Union Carbide's representatives physically followed Mr. Fernicola with the first shipment of drums from Bound Brook to confirm that Mr. Fernicola was removing drums to the Dover Landfill. Mr. Fernicola entered into a separate rental agreement with the Reichs, unbeknownst to Union Carbide, for storage of materials at the Site. Mr. Fernicola reportedly also disposed of wastes at the site by emptying drums into trenches in violation of his agreement with Union Carbide and perhaps in violation of his agreement with the Reich family. It was never our intention to have materials stored or disposed of at Reich Farm. Under the terms of CERCLA, we seriously question the appropriateness of our being named in this matter.

5. Cause and Effect

As developed in greater detail in our discussions below, we believe the investigation of other possible sources of contamination at the Site has been extremely limited. There is some likelihood that a variety of sources other than Union Carbide materials may have caused the current conditions. Of particular interest is an affidavit prepared for use in the 1975 New Jersey DEP litigation, executed by the individual assigned to supervise the DEP investigation of suspected groundwater contamination near the Site. That affidavit, attached hereto as signed by Mr. Steven H. Corwin, states at paragraph 9 that Mr. Corwin never believed that "any information collected by DEP employees prior to [his] resignation on or about September 15, 1975, provides an adequate basis for identifying the source of any contaminants which may have entered the groundwater that flows beneath the Pleasant Plains and adjacent areas of Dover Township. In paragraph 10, Mr. Corwin continues, "In particular, I believe that one cannot conclude from such information that certain chemical wastes are the cause of any suspected contamination. The chemical wastes to which I refer are those which may have been obtained from the Bound Brook, N.J. facilities of Union Carbide Corporation..." Thus, if anything, it appears that we may be dealing with a question of area-wide contamination rather than a problem attributable to the disposals of 1971.

The purpose of the above historical review is simply to reflect Union Carbide's belief that it is being miscast as acquiescing to the dumping of wastes which have caused serious concerns at the Site. The above historical discussion indicates that Union Carbide as well as others were unwittingly victimized, and that at least prior to the development of the RIFS, there was serious question as to whether Reich Farm should have been considered for investigation in the first place. We believe a strong argument can be made that any obligation of Union Carbide for further Site investigation and remediation, if necessary, had been discharged via the DEP settlement. Keeping this background discussion in mind, we shall now proceed to a detailed review of the RIFS and PRAP.

II. RIFS and PRAP

CERCLA Section 113(k)(2)(B)(ii) provides that interested persons be given a "reasonable opportunity to comment and provide information regarding the [remedial action] plan." We note that even given the three-day extension for commenting, we have had approximately four weeks to digest reams of information provided with your letter of August 22. During this time period, we have had the benefit of utilizing the services of Malcolm Pirnie, Inc., Environmental Engineering Consultants, and yet, given the short time frame, neither we nor our consultants have been able to give the documents the attention which they merit. It appears that the only reason for this extremely short time period is the Region's arbitrary deadline for executing a Record of Decision (ROD) by the end of September. Given the complexity of the RIFS and the large expenditures of money called for in performing the remedial action, we believe that an additional several weeks are needed for sufficient review. Also, as will be noted below, we have not been given access to the initial RIFS performed by NUS Corporation, whose findings undoubtedly bear on the PRAP. We also note that any opportunity to compare potentially conflicting data which may have been generated by the New Jersey DEP has been effectively lost due to the time pressure to review the documents at hand. Thus, we believe the dictates of Section 113(k) have been violated. Union Carbide therefore reserves the right to deliver additional comments on the package as further review is completed.

A. General Comments

The following general comments are based on a broad overview of the RIFS and PRAP and are numbered sequentially for ease of reference.

1. The remedial investigation is incomplete and

inconsistent with EPA guidance documents in a variety of respects (to be amplified in the "Remedial Investigation" section below).

2. The documents reflect inadequate investigation of current operations at the Site and their possible impact on contamination.

3. The prior extensive cleanups by Union Carbide in 1972 and 1974 are given inadequate consideration and review in the documents.

4. As described in the Background section of these comments (see above), we do not believe that all interested parties have been presented with these documents for review. These additional parties could include the waste hauler as well as any industrial concerns at the Site.

5. We note that alleged contamination at the Site has had no measurable effect on any off-site water supply. We believe greater emphasis should have been placed on this critical point in the documents. We also note that a public water supply is readily available to nearby water users who may be even potentially impacted. On-site and nearby wells have been closed due to area-wide groundwater contamination.

6. A review of the documents indicates that the Endangerment Assessment incorrectly calculates the level of contamination to be expected in the future and thus overestimates the possible future risks which might be present at the Site.

7. The Feasibility Study is incomplete and inconsistent with EPA guidance documents (to be amplified in the "Feasibility Study" section below).

8. In addition to the treatment technologies described in the Feasibility Study and the PRAP, we believe there are other treatment equivalents at lower cost levels which are not considered or are prematurely eliminated without sufficient reason.

9. The treatment technologies described in the Feasibility Study do not adequately recognize potential process, operating, design and construction problems which could result in a significant underestimation of remediation costs.

10. The Feasibility Study overestimates the adequacy and maintenance problems of the capping alternatives, resulting in an overly conservative PRAP.

11. The ARARs indicated for the compound specific and action specific alternatives are inconsistent with Agency ARAR guidance. Various items suggested as ARARs are either not promulgated standards or are applied in the wrong manner (to be amplified in the "ARARs" section below).

12. Cost calculations do not reflect the level of worker protection which may be required at the Site, thus underestimating remediation costs for some alternatives.

B. Remedial investigation (RI) - Detailed comments

1. Incomplete Data Base.

The information presented in the RI did not constitute the full data base utilized by the Agency in defining the scope of problems at the Site and the required solutions. Specifically, the EPA has not provided the preliminary RI performed by NUS, as well as other possibly relevant data and documents. Only Ebasco's reports were provided to Union Carbide. Data which may have been collected by the New Jersey DEP as part of routine monitoring of the Toms River Water Company or DEP's on-site monitoring pursuant to its settlement with Union Carbide were not included with the package and apparently were not considered. We believe it is essential that Union Carbide and other interested persons receive all relevant data in order to accomplish a thorough and complete review of the issues presented in the RIFS and PRAP.

2. Other Potential Contamination Sources.

It appears that Region II has interpreted all of the contamination at the Site as having been caused by the unauthorized disposal of Union Carbide materials by Mr. Fernicola. Absent a comprehensive analysis of other possible contamination sources, this conclusion cannot be supported. Consideration must be given to potential sources such as septic systems (regionally), on-site activities by tenants, and spills in the vicinity of the Site. We believe a full listing of all on-site uses occurring between the time of Union Carbide's remediation activities in 1974 and the present, as well as significant pre-1971 uses is required. Of interest, the RI indicates that a construction company and excavating company are both on site, and heavy traffic of large commercial vehicles is noted (page 1-8). The RI further notes the presence of a "gas pump", a "sump", a "decon pad", and a variety of concrete pads in the areas where contamination is present. The benzene, xylene and toluene which are present in soils and groundwater at the site could well be the result of gasoline use, while the chlorinated solvents at the Site are more characteristic of equipment cleaning and maintenance than of the Union Carbide materials allegedly at the Site. It does not appear that a full review of all site spill records which may reside in state and Federal files as well as in the files of other occupants since 1974, has been undertaken. In short, the RI is incomplete if a thorough search for other possible sources of organic chemical contamination was not made.

3. Site History.

Insufficient attention has been spent on evaluating the impact of Site activities since 1971. The condition of the Site at the completion of the 1974 Union Carbide remediation was apparently not researched in preparing the RIFS and no mention of any search for data regarding sampling at that time was included. While the RI mentions the possibility of sewers at the Site, no comprehensive site map which shows utilities (sewer and water lines in particular) and septic systems has been produced. A site map is required to show the specific locations where drums which allegedly contributed to the contamination were stored and handled, the location of soil excavation in 1974 and other significant activities since 1971.

4. Background Contamination.

Insufficient attention has been paid to defining sources and concentrations of background contamination at the Site and in the region. Such sources include septic tanks, storm runoff from roads and parking areas, use of agricultural chemicals, upgradient contamination sources and possibly other activities. Current activity on the site (and nearby) could influence the investigative results of NUS and Ebasco. We note, for example that some contamination is reported outside the study area and that some areas with reported soil contamination have no accompanying groundwater contamination. In 1975, wells upgradient of the Site were closed due to area-wide contamination. The upgradient wells monitored in the RI also have some contamination at levels exceeding some on-site wells. The DEP Special Assistant who supervised the investigation of suspected groundwater contamination in the area was unable to conclude that there was any causal relationship between the Union Carbide materials placed on the Site and the suspected contamination (see attached affidavit). The RI contains no reports of any monitoring which may have been performed by the State of New Jersey pursuant to its settlement with Union Carbide alluded to earlier.

5. Comparison of 1986 and 1987 analytical data.

We note that major discrepancies exist between chemical analyses of soil and groundwater samples taken in 1986 and 1987 by the two contractors. The RI concludes in part that these differences in groundwater analyses are the result of the movement of contamination in the intervening year. However, soil analyses in areas which appear to be geographically similar and at similar depths often are significantly different, with the 1987 data being generally greater than the 1986 results. We submit that a far more likely explanation is the difference in laboratories used by NUS and Ebasco. Another possibility is additional contamination during the 1986 to 1987 time span. The RI does not include the raw laboratory data or the QA/QC reports, and we are thus unable to make a direct comparison between the labs. However, due to the significant differences noted in the two sets of data, it is obviously a mandatory step to have further sampling performed before deciding on the need for selecting any of the remedial alternatives in the PRAP.

6. Groundwater Flow Model.

Full review and evaluation of the groundwater flow model cannot be accomplished without full details on the model and the input data. Copies of calibration and sensitivity runs are also needed for full evaluation.

7. Adequacy of Analytical Data.

Only two sets of water samples were collected which provided different analytical results. As noted previously, the two sets of soil samples provide significantly different results for what appear to be similar locations and depths. Additional samples should be collected and all field and laboratory QA/QC requirements should be provided for evaluation by interested persons.

8. Pumping Test.

Ebasco conducted a single pumping test consisting of a step test followed by a constant rate test. The transmissivity and storativity values from this test form the basis of Ebasco's groundwater flow model and calculations. These values represent the high range of actual values which will differ at different locations around the Site. The data plots show a wide scatter of data points and relatively small water level drawdown. Under these conditions, water level changes due to other causes could be significant. There was no indication that these other causes were considered in the analyses. In order to adequately evaluate the validity of the pump tests and other items dependent on the aquifer coefficients, more details on the tests and analyses are required.

C. The Endangerment Assessment (EA) - Detailed Comments.

1. Steady State Groundwater Contaminant Concentrations.

Ebasco has projected steady state concentrations of contaminants in groundwater based on maximum concentrations of the contaminants detected in the soil divided by the distribution constant (Kd). Union Carbide believes this does not represent a realistic approach to estimating future groundwater contamination for several reasons. The methodology utilized by Ebasco is ultraconservative and does not provide a realistic estimate of the material which would actually flow from the vadose zone to the aquifer. Once at the aquifer, dilution would be significant in the Cohansey system. In addition, the Ebasco estimates consider only the maximum soil concentrations and do not consider mean or no contamination areas in evaluating aquifer recharge from the Site. Other factors of major importance which reduce contaminant concentration over time are neglected as well, including biodegradation and dispersion. Also, estimated groundwater concentrations of chlorobenzene, ethylbenzene, toluene and styrene are approximately one order of magnitude greater than the maximum soil concentration, which is an unrealistic estimate and not confirmed by actual field data. A simple laboratory extraction test to determine the leachability of contaminants from the soil would be far more meaningful than the arbitrary application of an abstract formula.

2. Calculation of Risks.

The calculations of carcinogenic and noncarcinogenic life risks assume an infinite source of contamination which will leach into the groundwater over a period of years while analyses indicate only limited zones of contamination with much of the area having no soil contamination. The calculation of lifetime cancer risks from the ingestion of contaminated groundwater is then based on the maximum groundwater contaminant concentrations and projected concentration of contaminants based on soil concentrations. As discussed above, these concentrations are extremely conservative representing at the most very small areas of the highest contamination in the vadose zone and are much higher than would actually be observed in the restricted Cohansey aquifer and even more conservative as compared to the Kirkwood usable aquifer at the Site. The inevitable result is an overestimation of potential risks which drives the need for any soil or groundwater remediation. We note that the calculations on page 5-8 suggest that chlorobenzene should be found in the groundwater now while the RI found no chlorobenzene at all. Thus, there are obviously significant questions regarding the validity of the calculations; further evaluation is certainly indicated.

3. Calculation of Mean Groundwater Concentrations.

The calculation of mean and geometric mean concentrations of contaminants in groundwater resulting from soil contamination utilized only detected values of contaminants in soil. This calculation is, again, overly conservative based on the relatively low frequency of detection of the six contaminants of concern in the groundwater. The frequency of detection ranged from 0 to 41% for these contaminants. A far more realistic picture of risk would be presented by using the detection limit of the compound as the low end of the range and including all analyzed samples in the calculation of mean and geometric mean values. Estimation of steady state groundwater concentrations should be calculated using mean soil concentrations and should include areas of the Site where no contamination was detected at the minimum detection limit. Processes such as natural dilution as discussed above should also be accounted for to allow for a conservative but more realistic impact on the aquifer.

4. Ingestion of Groundwater - Carcinogenic Effects.

The EA calculates the risk from ingestion of water containing BEHP based on the maximum detected groundwater concentration. This value of 2,200 mg/l is almost twice that of the compound's solubility (1300 mg/l). While the report acknowledges that this result is anomalous, no correction has been made on the risk tables and a false, higher risk is presented.

5. Dilution of Contaminant Concentrations in the Aquifer.

Dilution of contaminants in the groundwater is not accounted for in the contaminant fate and risk calculations. With net recharge of approximately 16 inches per year in the area, significant dilution on any water which percolates through the contaminated areas of the Site in the Cohansey water table aquifer would be seen. The dilution would result in lowered groundwater concentrations at the point of potential exposure.

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D. Feasibility Study (FS) - Detailed Comments.

1. Interaction Between Remediation of Groundwater and Soil.

The FS separately evaluates the need to remediate soil and the need to remediate groundwater. Each of the alternatives proposed for one medium will have an impact on the need for and the effectiveness of the remediation of the other medium. For example, the pump, treat, and reinjection alternatives for groundwater will remove a significant amount of the reported contamination from the vadose zone soil column depending on the selected site of the reinjection. The groundwater collection system would also capture any contaminants that escape the soil column during the 10 years of operation. Given the fact that the volume of contaminated soil is small, the impact of the natural flushing action which will occur during the proposed groundwater remediation on the need to remove contaminated soil should be evaluated.

Similarly, the removal of contaminated soil will have a major impact on the potential movement of contaminants to the groundwater and result in the dispersion of any remaining plume which may exist. Since the rationale for the groundwater remediation is the possible use of the groundwater as a source of potable water in the future, the evaluation of the dispersion potential of any remaining plume absent a recharge source is necessary in order to fully assess the need for the combination of soil and groundwater remediation.

2. Pumping Alternative.

The FS indicates that pumping alternatives consist of two Cohansey Wells, each pumping 30 gpm. Considering the data contained in the RI and other published data on the formation, there is no assurance that this system would contain and capture the contaminated groundwater plume. Additional data beyond that available in the FS is needed to select and cost an appropriate method of groundwater remediation. For example, the basis for spacing of wells is not defined and wells of different depth may be required to adequately control the plume. The justification for the total pumping rate of 60 gpm is not presented and the rate may be incorrect. This alternative requires additional data presentation and/or study for proper evaluation. The FS also neglects the impact of such pumping on the region and on other wells.

3. Groundwater Injection.

The FS alternatives which include groundwater pumping also consist of four upgradient injection wells. There are no data or discussion of the potential problem of injecting the water through injection wells. Problems which have occurred at similar wells include aquifer blocking through accumulation of particulates, biological growth and gas locking. More wells or an alternative method of recharge may be necessary. Further evaluation is required before the technical feasibility of the injection concept can be adequately reviewed.

4. UV - H_2O_2 Oxidation.

Typically, UV-H_2O_2 treatment has been used mainly for the initial breakdown of organic contaminants at high concentrations. Treatment of low levels of organic contaminants as have been detected at the Site in order to reach the objective levels has not been well documented. Thus, the effectiveness of this treatment alternative for the site specific conditions encountered is highly questionable.

5. Excavation of Contaminated Soil.

The technical evaluation of the soil excavation alternatives is incomplete for several reasons. For example, consideration is not given to the health hazards associated with the excavation. Organic contamination levels detected in the soil could result in volatilization when exposed to the atmosphere. Neighborhood exposures, worker protection, and the associated costs for working under "Level B" conditions are not accounted for in the FS. For example, the EA calculates risks from the inhalation of volatile organic vapors from open trenches in the soil. Very high risk numbers are projected for tetrachloroethene. The validity of these calculations is highly questionable due to the low levels for most tetrachloroethene analyses in soil. Also, this risk does not exist unless trenching is taking place. However, if accurate, it points to a need for concern which is not raised in the FS discussion of excavation alternatives.

In addition, the FS does not consider the mechanical constraints associated with excavating Cohansey sand to a depth of 30 feet. The Cohansey sand is a loose, uncohesive soil which when excavated will tend to cave, resulting in the need for significantly larger excavation areas than indicated or for shoring while excavating. These items are major considerations and are not accounted for in the cost analysis.

6. Vapor Phase Treatment.

Ebasco assumes that operation of the air stripper will not require vapor phase treatment since emission levels will be within federal and state requirements. There has been no modeling done to confirm this conclusion and consideration has not been given to the proximity of residences to the site. Further evaluation of air emissions are required to evaluate this treatment option. Public concern plus a significant increase in the cost of this alternative will result if vapor phase carbon treatment is necessary.

7. Enhanced Volatilization.

The historical track record of the effectiveness of the enhanced volatilization treatment alternative is not evaluated in the FS. The costs associated with predesign testing and development of this technology must be included in the cost analysis.

8. Grout Curtain.

Ebasco's soil remediation alternative S-2 recommends construction of a grout curtain surrounding the contaminated soil and extending from the surface to the water table. The need for the grout curtain is plainly not justified. As water movement in the vadose zone would be chiefly vertical, the grout curtain would not contribute to isolating the contaminated soil from downward percolating water and should be eliminated from the alternative altogether. Elimination of the grout curtain significantly decreases the cost of alternative S-2 with no decrease in effectiveness.

E. Premature Elimination of Other Viable Technologies.

1. Capping of Contaminated Soil Areas.

Full evaluation of all available capping alternatives is not given in the FS. While it is realized that maintenance will be required on any cap, this should not be a limiting factor in the selection of a capping alternative. The major purpose of the cap in the alternatives discussed is to limit the amount of rainfall and runoff which will percolate into the aquifer. The EA clearly indicates no exposure pathways resulting from contact with the waste and does not justify the need for a RCRA style cap. RCRA cap specifications would not be relevant and appropriate. Therefore, a less stringent cap designed primarily to enhance runoff will accomplish the objectives of limiting percolation. Significant cost savings can be realized from an asphalt or a concrete cap which will provide the same effectiveness as a multilayer cap with no decrease in effectiveness.

2. Off-Site Disposal.

Adequate consideration has not been given to the disposal of contaminated soils off site in an off-site hazardous or non-hazardous waste landfill. The low levels of contaminants detected in the majority of the soil may be amenable to this method of disposal in a properly designed landfill. An analysis of the wastes which were placed on the Site and the characterization of the soils is required to evaluate whether hazardous waste regulations or land ban provisions apply to the waste. Recent RCRA regulations clearly provide a mechanism for disposal of hazardous materials from CERCLA sites in landfills. (See also section on ARARs.)

3. Groundwater Discharge Alternatives.

Ebasco did not fully evaluate the alternatives for discharge of pumped groundwater. Full consideration should have been given to the direct discharge of treated water to the Toms River rather than reinjection into the aquifer.

4. Groundwater Treatment Alternatives.

Ebasco prematurely deleted and did not fully evaluate treatment of contaminated groundwater at a publicly owned treatment works (POTW). Interference by the organic contaminants in the groundwater with activated sludge aeration processes at a POTW is extremely unlikely given the very low concentrations detected and the significant dilution that would occur before the groundwater reaches the POTW. This alternative certainly merits further study.

F. Improper Costing.

1. Carbon Adsorption Costs.

The capital costs for carbon adsorption do not include items such as initial carbon, piping, electrical and other items required to establish this technology. On the basis of contamination levels and the flow rate given in the FS we estimate that the costs for carbon adsorption contained in the FS are approximately 50% lower than projected actual costs.

2. Extent of Soil Contamination.

The Study did not bound the areas of soil contamination. Therefore the amount of soil to be removed under the excavation alternatives and associated excavation, treatment, or disposal costs cannot properly be estimated. A contingency amount is required to be used in the cost estimates to reflect this uncertainty.

G. ARARs-Inappropriate Selection of ARARs in the FS.

1. New Jersey Soil Cleanup Standards

The section on ARARs does not adequately separate the various types of ARARs and correctly evaluate the need for compliance. As an example, the New Jersey Soil Cleanup Standards quoted are not promulgated standards but, as noted in the FS, are Guidelines to be used in establishing standards for ECRA cleanups when no other criteria are available. These "Standards" serve as a "Red Flag" for further attention to determine whether additional risk assessment is appropriate for the site to establish more appropriate soil cleanup standards. In general, these surrogate levels are not cleanup numbers. In fact, since this Site is being handled as a CERCLA site, a more complete risk assessment has already been completed and, once the previously described flaws are corrected to evaluate the reasonable risks to the groundwater, would serve as a much more appropriate standard than an arbitrarily selected and non-promulgated "Red Flag".

2. SDWA Maximum Contaminant Levels

MCL's set under the Safe Drinking Water Act have been suggested as ARARs for water quality. The use of MCL's and the point of application of the criteria at this Site requires significant discussion. The MCL is only legally applicable for public drinking water supplies as described in the Act. The closest point of such possible application is the TRWC well system which the RI concluded was not currently impacted by the site. The RI indicated that the TRWC might at some time in the future be impacted although the magnitude of the impact was not correctly evaluated to consider realistic conditions and current groundwater conditions at the Site. Application of the MCL's to the TRWC using realistic conditions of exposure would provide a use of the MCL's consistent with EPA guidance. The application of MCL's in the area of the Site is not consistent with the Guidance because the groundwater in the area of the Site is subject to a ban on use due to alleged area-wide contamination. Effective administrative controls are in place. The contamination source which is responsible for the groundwater controls has not been specifically identified. With the groundwater use restriction in place the area should be classified as a Class III aquifer and MCL's are neither applicable nor relevant and appropriate standards.

3. Federal Water Quality Criteria

Federal Water Quality Criteria are not appropriate as ARARs since there is no release to a surface water. In the context of this Site, these criteria are simply irrelevant.

4. RCRA Requirements

Several references are made to RCRA type requirements as ARARs. In particular, RCRA land ban requirements are mentioned as ARARs. Recent RCRA regulations provide a specific exemption from RCRA land bans for contaminated soil and debris from CERCLA actions until 1990. RCRA landfill capping requirements are not applicable since the Site is not a landfill and are not relevant and appropriate since the primary purpose of a cap would be only to limit percolation.

III. PRAP

Given the information provided in the August 22nd package, we seriously question whether remediation beyond the no-action alternative is justifiable at Reich Farm. As noted in the PRAP summary section, a selected remedy must be protective of human health and the environment. We submit that the Site meets this very standard today. It is only by using the overly conservative assumptions described earlier that one can conclude otherwise. Even the core notion of separate groundwater and soil remediation programs makes little sense when we are required to assume that remediation of one medium will have absolutely no effect on remediation of the other.

The cleanup levels described in the PRAP (and the FS) are based on a mix of the ultraconservative ~~Endangerment Assessment~~ and ARARs that are of questionable validity. As described in the ARARs section, the standards chosen are simply inappropriate for this Site.

We note that there is continued reference in the PRAP to protection of the public through access restriction and prevention of well contamination. As discussed above, the nearby wells are sealed under an effective administrative control due to area-wide contamination, and a public water supply is always available if needed. The RIFS itself indicates that there is no danger from physical contact with the soil at the Site.

The comments which we provided in the FS discussion are of course applicable to the discussion of cleanup alternatives in the PRAP. We only wish to reiterate here that the information supplied to date is wholly unconvincing as to the need for greater protection of health, safety and the environment at Reich Farm.

IV. SUMMARY AND CONCLUSION

Based on the above discussion, we believe the PRAP is driven by an incomplete and overly conservative RIFS. Specifically, a significant amount of work is required in the areas of risk assessment and endangerment assessment before a meaningful PRAP can be developed. We would be most interested in discussing with Region II our thoughts as to how specific sections of the RIFS could be supplemented, along with the possibility of private funding and performance of required analyses.

Given the amount of work which remains to be done as well as the fact that review time has been severely and arbitrarily limited, it is premature to issue a ROD at the present time. However, if Region II believes that the ROD is mandated in the time frame that has been discussed, we implore the Agency to issue a ROD that will permit wide latitude in developing appropriate and adequately protective standards. We frankly do not see how a ROD could be issued with the specific cleanup levels required by the PRAP in accordance with the FS at the present time. We would be most interested in working with the Agency in developing appropriate standards based on a conservative but realistic set of assumptions. As you know, we have been unsuccessful in our efforts at arranging a meeting with Region II to discuss the issues described above. We remain hopeful that such a meeting can be held in the near future.

If there are any questions or comments on any of the above, please call the undersigned at 203-794-6225.

Very truly yours,

Gerald E. Klein
Environmental Counsel

GEK/jem
cc: J.C. Hovious
Joseph McVeigh, Esq.
Region II, Office of Regional Counsel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
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September 29, 1988

Gerald E. Klein
Environmental Counsel
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Dear Mr. Klein:

This is in response to your letter of September 20, 1988, in which you provided comments on the Reich Farm Remedial Investigation, Feasibility Study, and Proposed Remedial Action Plan for the Reich Farm Superfund site in Dover Township, New Jersey.

Attached are the responses to the technical comments, noted "General Comments", "Detailed Comments" and other technical issues submitted to the Environmental Protection Agency. Please be advised that our remedial contractor, Ebasco Services, assisted us in the preparation of this reply. Each response is numbered to correspond to the comment it addresses.

Thank you for submitting your comments in a timely manner. Now that the public comment period is officially closed, they will be included in the Responsiveness Summary section of the Record of Decision for the Reich Farm site.

I hope that your concerns have been satifactorily addressed.

Sincerely yours,

Romona Pezzella

Romona Pezzella, Project Manager
Southern New Jersey Remedial Action Section

Attachment

UNION CARBIDE COMMENTS

Reich Farm

A. General Comments

1. This comment will be addressed in the response to the "Remedial Investigation" section.

2. EPA has monitored the disposal activities of the companies which currently occupy the site, and will continue to do so. The nature of the contamination at the Reich Farm site, which was defined in the Supplemental Remedial Investigation report, is consistent with the types of wastes found there in 1971. In addition, the extent of contamination is representative of residual wastes which remained at the site after the two cleanup actions undertaken by Union Carbide in 1972 and 1974.

3. EPA recognizes that Union Carbide performed cleanup activities, which included drum and soil removal, at the Reich Farm site in 1972 and 1974. These cleanups are detailed in the "Site History" section of the Supplemental Remedial Investigation report. They are also represented by the data presented in this report which indicates that the surface soils on-site are relatively free of contamination.

4. This concern is not within the scope of the requested comments on the Remedial Investigation and Feasibility Study (RI/FS) and Proposed Remedial Action Plan (PRAP) for the Reich Farm site.

5. Although the remedial investigations indicate that private potable wells currently in use have not been contaminated by the Reich Farm site, these wells may become impacted in the future if no remedial action is taken and contaminant migration is allowed to continue. In addition, the public water supply wellfield located downgradient of the site has shown low levels of trichloroethene (TCE) above the Maximum Contaminant Level (MCL) which the State of New Jersey has established for this compound. Additional sampling is needed to define the leading edge of the plume originating from the site and to determine if Reich Farm is the source of the TCE which has been detected at the municipal wellfield. This sampling will be conducted during design of the remedial action for the site.

6. This comment will be addressed in the response to the detailed Endangerment Assessment comments.

7. This comment will be addressed in the response to the "Feasibility Study" section.

8. A number of treatment technologies were identified in the feasibility study (FS) for consideration at Reich Farm. The most promising technologies were assembled into remedial alternatives and evaluated in the FS report. With the exception of no action, the alternatives presented in the FS and PRAP the exception of no action provide a balance among the nine criteria which EPA uses to evaluate remedial actions. The alternatives which were selected to remediate the soil and ground water at Reich Farm provided the best balance between the nine criteria, one of which is cost-effectiveness.

9. Process, operating, design and construction problems which may be associated with a remedial alternative are among the factors considered by EPA's contractor when developing cost estimates in the feasibility study. In addition, these cost estimates are generally based on previous experience with the treatment technologies as well as price quotes provided by vendors.

10. The adequacy of the containment alternative and the problems associated with maintaining the containment system were contributing factors in the decision not to select this alternative as the remedy for the contaminated soils on-site.

11. This comment will be addressed in the response to the "ARARs" section.

12. The degree of worker protection required for each alternative is considered when developing cost estimates.

B. Remedial Investigation (RI) - Detailed Comments

1. Incomplete Data Base

The Supplement Remedial Investigation report (Ebasco) presented data from both the NUS and Ebasco site investigations which were conducted in 1986 and 1987, respectively. The conclusions drawn in the RI report on the nature and extent of contamination at the site were based solely upon this data and the alternatives evaluated in the feasibility study were developed to address these conclusions. In regard to data from the Toms River Water Company (TRWC), EPA collected data from TRWC wells during both the 1986 and 1987 remedial investigations. We believe this data is sufficient to characterize the water which this utility supplies. At this time, EPA is unaware of the existence of any site data generated by the New Jersey Department of Environmental Protection (NJDEP) following the Union Carbide cleanup in 1974.

2. Other Potential Contamination Sources

The nature of the contamination at the site is consistent with the wastes which were found there in 1971. The absence of significant contamination in the surface soils on-site reflects the previous cleanup activities undertaken by Union Carbide. The fact that significant soil contamination was only found at depths of greater than ten feet indicates than no new contamination (post 1974) has been introduced at the site. A preliminary investigation of current site activities does not indicate that hazardous substances are being disposed of on-site. At this time, EPA has no evidence that any wastes were disposed after the 1974 cleanup.

3. Site History

As part of the pre-RI/FS activities, EPA and its contractors attempted to locate all historical documents pertaining to previous site activities and the condition of the site following the 1974 cleanup. The information which was available is presented in Section 1 of the Supplemental Remedial Investigation report. A map detailing the locations of utilities and septic systems was not provided in the Supplemental Remedial Investigation report, but will be generated, if necessary. A map which indicates the location of the drum staging and trenching areas is provided in the report. This map is based on conversations with persons who were present on the site at the time of the cleanup activities as well as aerial photographs taken during this period.

4. Background Contamination

The purpose of the remedial investigations conducted by EPA and its contractors was to define the nature and extent of contamination at Reich Farm. As previously stated, the disposal practices of the current site occupants have been monitored in the past and will continue to be monitored in the future. Please note that the Reich Farm study area encompassed approximately 15 acres and no contamination was found outside of this area. With regard to your concern about soil contamination with no accompanying ground water contamination, EPA believes that some of the pollutants in the soil have not migrated down as far as the water table. EPA sampled monitoring wells upgradient of the site during both site investigations. No compounds which are considered contaminants of concern for Reich Farm (the remedial action for the site will address the removal of all contaminants of concern) were detected in these wells.

The above indicates that the source of the contamination found at Reich Farm is not located upgradient of the site. A validated data base could not be generated from the ground water data collected in 1974 and, therefore, this information was not incorporated into the RI/FS evaluation. As stated previously, EPA is unaware of any data collected at the site by NJDEP following the cleanup conducted by Union Carbide in 1974.

5. Comparison of 1986 and 1987 Analytical Data

The contamination at the site was a result of numerous discreet events (material leaks from drums and random discharges into trenches) that may have occurred at different times. The locations of soil contamination were consistent with the areas where drums were stored and trench wastes were disposed. The data collected during the remedial investigations was subjected to a full quality assurance and quality control (QA/QC) evaluation. All data which was not validated through the QA/QC process was deleted from the Remedial Investigation report and not used as the basis for any conclusions involving the level of contamination at the site. Additional soil and ground water sampling is an integral part of the site remedy. This sampling will further delineate those areas of the soil and ground water which require remediation.

6. Groundwater Flow Model

The primary parameters in calibrating the model were the hydraulic conductivity and average annual infiltration rate of rainwater. As explained in Appendix K of the RI report, the best (i.e. final) values of these parameters were 133 feet/day and 19 inches/year, respectively. These values could accurately predict the groundwater elevations measured at the Reich Farm site. Since they are extremely close to the accepted values, and it was not the intent of the study to design a pumping system, additional sensitivity studies were not performed. The computer outputs from the calibration runs can be made available.

7. Adequacy of Analytical Data

See response to comment 5.

8. Pumping Test

No localized effects from cyclical pumping were determined, either from pumping records or from water level measurements. The pumping test was conducted during a very cold period with frozen ground and no ground water recharge. These conditions caused a slight water table decline during the brief pumping period. From measurements taken before pumping, during pumping, and during and at the end of the recovery period, the decline should have produced little error in the transmissivity (T) and storage (S) calculations. The T and S values are considered to be consistent.

C. The Endangerment Assessment (EA) - Detailed Comments

1. Steady State Groundwater Contaminant Concentrations

The computation of steady state conditions based on maximum soil concentrations and Kd values were required to indicate the maximum undiluted concentrations which contaminants presently in the soil can attain in the ground water. These values were then used in the Endangerment Assessment to provide the most conservative estimate of the risk that could result if this migration was to occur and if the ground water at the site was then ingested. The most conservative estimate of risk is a mandate of any risk assessment performed for a Superfund site in order to select a remedy which is highly protective of human health.

2. Calculation of Risks

As stated above, the methods used to quantify the risks associated with a Superfund site are required to be conservative. Note that it is not necessary that an infinite source of a contaminant be present to produce a health risk over a lifetime; however, the amount must be sufficient in quantity to allow leaching into the ground water over an extended period of time. In addition, the calculations on page 5-8 of the Supplemental Remedial Investigation report do not indicate that chlorobenze should be presently found in the ground water. The time required to reach the water table was based on the depth at which the contaminant is currently found in the soil; this time period is calculated from the present and not from the time the dumping occured.

3. Calculation of Mean Groundwater Concentrations

See comments 1 and 2.

4. Ingestion of Groundwater - Carcinogenic Effects

Although the level of BEHP in one ground water sample was almost twice that of its solubility, this value must be used in the risk assessment since it was not rejected during the QA/QC review. Note that this value was considered an anamoly and it was not used in the determining the remedial objectives for the cleanup at the site. Additional sampling will be performed as part of the site remedy to determine the true magnitude of BEHP contamination in the ground water.

5. Dilution of Contaminant Concentrations in the Aquifer

EPA does not rely on dilution of contamination to achieve desired concentrations. Rather, when conducting remedial actions at Superfund sites, policy dictates that ground water at the point of discharge be cleaned up to levels which are considered safe for drinking purposes.

D. Feasibility Study (FS) - Detailed Comments

1. Interaction Between Remediation of Groundwater and Soil

The ground water extracted from the contaminant plume will be treated and injected upgradient of the site and into the saturated zone. This is intended to accelerate the flushing of the saturated zone. The flushing of unsaturated soil would be from the mounding expected in the vicinity upgradient of the site. This unsaturated soil in not within the dumping and trenching areas and not believed to be contaminated. If the mounding extends into the dumping and trenching areas, then some flushing of contaminants from the soil would occur.

The Feasibility Study report noted (Section 4.2.2.2) that if the soil is remediated, the length of time for ground water treatment might be expected to be on the order of 3 to 4 years instead of the 11 years which was presented as the time needed to fully implement this alternative.

2. Pumping Alternatives

The pumping alternative is based on the limited amount of data available. It is fully intended to collect additional data prior to implementing the ground water cleanup. A refinement of the pumping rate and the spacing of the wells would be performed during the detailed design of the system. The 60 gallons per minute (gpm) rate was determined to be sufficient to capture the measured plume and not impact the aquifer. The pumping might have some impact on residential wells in the immediate vicinity of the site; however, all of the residential wells near the site have been closed. The computations used by Ebasco to estimate the pumping rate are proprietary and are not part of the FS report which is a public document.

3. Groundwater Injection

The use of four reinjection wells is expected to prevent aquifer blocking. The pumping wells should be properly developed to minimize any particulates in the treated water. The carbon beds used for each treatment alternative can be expected to collect trace particles present in the water. Biological growth and gas locking are not considered to be of concern for the low flow rates proposed per well.

4. UV-Peroxide Oxidation

Vendor tests have been performed with the compounds prevalent at the Reich Farm site. At the concentration levels found, the residence times selected are expected to react 95 to 100 percent of the compounds in the ground water.

5. Excavation of Contaminated Soil

Level B protection is not expected to be required during any of the excavation activities. Even if Level B is required during excavation and treatment of a number of "hot spots", it would not significantly change the cost estimate of the soil remediation which EPA policy requires to be within a range of plus 50 percent to minus 35 percent of the true cost.

The discussion of the soil alternatives points to the need for additional samples in the area surrounding "hot spots" to better define the estimated extent of soil to be excavated and remediated. During the design stage, with the additional data available, a better prediction of the level of protection needed will be determined.

The cost estimate for excavation activities was specific to the type of soil found on-site.

6. Vapor Phase Treatment

Even if the volatile compounds in the ground water were 200 parts per billion (ppb) (more than double the mean value), at a treatment rate of 60 gpm and assuming 100 percent removal in the air stripper, the organic emissions would be 0.006 pounds/hour which is far below the New Jersey standard of 0.1 pounds/hour.

7. Enhanced Volatilization

The enhanced volatilization unit should have no difficulty in removing the volatile compounds in the soil based on its performance at other sites.

8. Grout Curtain

A grout curtain for enclosing each of the contaminated areas was considered to prevent any potential horizontal migration of water. The potential for horizontal migration exists because of the clay lenses found onsite. Once the boundries of the contaminated areas are more precisely defined and if it was determined that no clay lenses were present in these locations, the need for the grout curtain could be evaluated.

E. Premature Elimination of Other Viable Technologies

1. Capping of Contaminated Soil Areas

The type of cap evaluated took into account the heavy truck traffic that occurs at the site. An asphalt or concrete cap would require more inspection and repair. In view of the relatively small size of the areas to be capped, the cap described in the FS report is considered a cost-effective part of a permanent remedy.

2. Off-Site Disposal

The Superfund Amendments and Reauthorization Act emphasizes permanent solutions and alternate treatment technologies to the maximum extent practicable. Landfilling is the least favored approach for dealing with site contamination problems. Since treatment is viable for the contaminated soils, landfilling was not seriously considered.

3. Groundwater Discharge Alternatives

Discharge of the ground water to the Toms River would have been technically more difficult than reinjection because of the distance between the river and the site. In addition, the local community has a history of being strongly against this type of disposal.

4. Groundwater Treatment Alternatives

There are no publicly owned treatment works presently located in the area of the Reich Farm site.

F. Improper Costing

1. Carbon Adsorption Costs

The capital cost items do include the carbon and piping and were based on prices provided by a vendor. Automatic valves are not included, therefore, electrical costs should not be incurred.

2. Extent of Soil Contamination

The assumed sizes of the areas of contamination were believed to be conservative based on the significant differences in the contamination found at nearby or colocated borings. Therefore, EPA does not believe that an additional contingency is necessary.

G. ARARs - Inappropriate Selection of ARARs in the FS

1. New Jersey Soil Cleanup Standards

EPA does not consider the New Jersey Soil Action Levels to be ARARs (applicable or relevant and appropriate requirements); however, in the absence of federal soil cleanup standards, they are guidelines to be considered in establishing cleanup objectives. The risk assessment conducted for Reich Farm indicated that the contaminated soils have a potential to cause a health risk if they migrate into the ground water. Thus, we intend to clean up the contaminated soils at Reich Farm to meet the New Jersey Soil Action Levels and believe that this represents a conservative approach to ensure adequate protection of human health and the environment.

2. SDWA Maximum Contaminant Levels

The Kirkwood-Cohansey aquifer system underlying the Reich Farm site is classified as a Class I (drinking water) aquifer; therefore, the New Jersey MCLs are considered relevant and appropriate as cleanup standards for the ground water.

3. Federal Water Quality Criteria

These criteria were not used as a remedial objective for cleanup of Reich Farm.

4. RCRA Requirements

Land ban regulations and capping requirements under the Resource Conservation and Recovery Act were not used as a criteria for evaluating the remedial alternatives.